User Guide

AV SWITCHERS

MLS 608 D SERIES

AV Switchers with ProDSP™

(with the MTP/HDMI U R receiver)

MLS 608 D SA

MTP/HDMI U R

Extron Electronics

INTERFACING, SWITCHING AND CONTROL

68-1893-01 Rev. A
12 11

Precautions

Safety Instructions • English

This symbol is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.

This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

Caution

Read Instructions • Read and understand all safety and operating instructions before using the equipment.

Retain Instructions • The safety instructions should be kept for future reference.

Follow Warnings • Follow all warnings and instructions marked on the equipment or in the user information.

Avoid Attachments • Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous.

Consignes de Sécurité • Français

Ce symbole sert à avertir l'utilisateur que la documentation fournie avec le matériel contient des instructions importantes concernant l'exploitation et la maintenance (réparation).

Ce symbole sert à avertir l'utilisateur de la présence dans le boîtier de l'appareil de tensions dangereuses non isolées posant des risques d'électrocution.

Attention

Lire les instructions• Prendre connaissance de toutes les consignes de sécurité et d'exploitation avant d'utiliser le matériel.

Conserver les instructions• Ranger les consignes de sécurité afin de pouvoir les consulter à l'avenir.

Respecter les avertissements • Observer tous les avertissements et consignes marqués sur le matériel ou présentés dans la documentation utilisateur.

Eviter les pièces de fixation • Ne pas utiliser de pièces de fixation ni d'outils non recommandés par le fabricant du matériel car cela risquerait de poser certains dangers.

Sicherheitsanleitungen • Deutsch

Dieses Symbol soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.

Dieses Symbol soll den Benutzer darauf aufmerksam machen, daß im Inneren des Gehäuses dieses Produktes gefährliche Spannungen, die nicht isoliert sind und die einen elektrischen Schock verursachen können, herrschen.

Achtung

Lesen der Anleitungen • Bevor Sie das Gerät zum ersten Mal verwenden, sollten Sie alle Sicherheits-und Bedienungsanleitungen genau durchlesen und verstehen.

Aufbewahren der Anleitungen • Die Hinweise zur elektrischen Sicherheit des Produktes sollten Sie aufbewahren, damit Sie im Bedarfsfall darauf zurückgreifen können.

Befolgen der Warnhinweise • Befolgen Sie alle Warnhinweise und Anleitungen auf dem Gerät oder in der Benutzerdokumentation.

Keine Zusatzgeräte • Verwenden Sie keine Werkzeuge oder Zusatzgeräte, die nicht ausdrücklich vom Hersteller empfohlen wurden, da diese eine Gefahrenquelle darstellen können.

Instrucciones de seguridad • Español

Este símbolo se utiliza para advertir al usuario sobre instrucciones importantes de operación y mantenimiento (o cambio de partes) que se desean destacar en el contenido de la documentación suministrada con los equipos.

Este símbolo se utiliza para advertir al usuario sobre la presencia de elementos con voltaje peligroso sin protección aislante, que puedan encontrarse dentro de la caja o alojamiento del producto, y que puedan representar riesgo de electrocución.

Precaucion

Leer las instrucciones • Leer y analizar todas las instrucciones de operación y seguridad, antes de usar el equipo.

Conservar las instrucciones • Conservar las instrucciones de seguridad para futura consulta.

Obedecer las advertencias • Todas las advertencias e instrucciones marcadas en el equipo o en la documentación del usuario, deben ser obedecidas.

Evitar el uso de accesorios • No usar herramientas o accesorios que no sean especificamente recomendados por el fabricante, ya que podrian implicar riesgos.

安全须知 • 中文

这个符号提示用户该设备用户手册中有重要的操作和维护说明。

这个符号警告用户该设备机壳内有暴露的危险电压，有触电危险。

注意

阅读说明书 • 用户使用该设备前必须阅读并理解所有安全和使用说明。

保存说明书 • 用户应保存安全说明书以备将来使用。

遵守警告 • 用户应遵守产品和用户指南上的所有安全和操作说明。

避免追加 • 不要使用该产品厂商没有推荐的工具或追加设备，以避免危险。

Warning

Power sources • This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with a main power system with a grounded (neutral) conductor. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.

Power disconnection • To remove power from the equipment safely, remove all power cords from the rear of the equipment, or the desktop power module (if detachable), or from the power source receptacle (wall plug).

Power cord protection • Power cords should be routed so that they are not likely to be stepped on or pinched by items placed upon or against them.

Servicing • Refer all servicing to qualified service personnel. There are no user-serviceable parts inside. To prevent the risk of shock, do not attempt to service this equipment yourself because opening or removing covers may expose you to dangerous voltage or other hazards.

Slots and openings • If the equipment has slots or holes in the enclosure, these are provided to prevent overheating of sensitive components inside. These openings must never be blocked by other objects.

Lithium battery • There is a danger of explosion if battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Avertissement

Alimentations• Ne faire fonctionner ce matériel qu'avec la source d'alimentation indiquée sur l'appareil. Ce matériel doit être utilisé avec une alimentation principale comportant un fil de terre (neutre). Le troisième contact (de mise à la terre) constitue un dispositif de sécurité : n'essayez pas de la contourner ni de la désactiver.

Déconnexion de l'alimentation• Pour mettre le matériel hors tension sans danger, déconnectez tous les cordons d'alimentation de l'arrière de l'appareil ou du module d'alimentation de bureau (s'il est amovible) ou encore de la prise secteur.

Protection du cordon d'alimentation • Acheminer les cordons d'alimentation de manière à ce que personne ne risque de marcher dessus et à ce qu'ils ne soient pas écrasés ou pincés par des objets.

Réparation-maintenance • Faire exécuter toutes les interventions de réparation-maintenance par un technicien qualifié. Aucun des éléments internes ne peut être réparé par l'utilisateur. Afin d'éviter tout danger d'électrocution, l'utilisateur ne doit pas essayer de procéder lui-même à ces opérations car l'ouverture ou le retrait des couvercles risquent de l'exposer à de hautes tensions et autres dangers.

Fentes et orifices • Si le boîtier de l'appareil comporte des fentes ou des orifices, ceux-ci servent à empêcher les composants internes sensibles de surchauffer. Ces ouvertures ne doivent jamais être bloquées par des objets.

Lithium Batterie • Il a danger d'explosion s'll y a remplacment incorrect de la batterie. Remplacer uniquement avec une batterie du meme type ou d'un ype equivalent recommande par le constructeur. Mettre au reut les batteries usagees conformement aux instructions du fabricant.

Vorsicht

Stromquellen • Dieses Gerät sollte nur über die auf dem Produkt angegebene Stromquelle betrieben werden. Dieses Gerät wurde für eine Verwendung mit einer Hauptstromleitung mit einem geerdeten (neutralen) Leiter konzipiert. Der dritte Kontakt ist für einen Erdanschluß, und stellt eine Sicherheitsfunktion dar. Diese sollte nicht umgangen oder außer Betrieb gesetzt werden.

Stromunterbrechung • Um das Gerät auf sichere Weise vom Netz zu trennen, sollten Sie alle Netzkabel aus der Rückseite des Gerätes, aus der externen Stomversorgung (falls dies möglich ist) oder aus der Wandsteckdose ziehen.

Schutz des Netzkabels • Netzkabel sollten stets so verlegt werden, daß sie nicht im Weg liegen und niemand darauf treten kann oder Objekte darauf- oder unmittelbar dagegengestellt werden können.

Wartung • Alle Wartungsmaßnahmen sollten nur von qualifiziertem Servicepersonal durchgeführt werden. Die internen Komponenten des Gerätes sind wartungsfrei. Zur Vermeidung eines elektrischen Schocks versuchen Sie in keinem Fall, dieses Gerät selbst öffnen, da beim Entfernen der Abdeckungen die Gefahr eines elektrischen Schlags und/oder andere Gefahren bestehen.

Schlitze und Öffnungen • Wenn das Gerät Schlitze oder Löcher im Gehäuse aufweist, dienen diese zur Vermeidung einer Überhitzung der empfindlichen Teile im Inneren. Diese Öffnungen dürfen niemals von anderen Objekten blockiert werden.

Litium-Batterie • Explosionsgefahr, falls die Batterie nicht richtig ersetzt wird. Ersetzen Sie verbrauchte Batterien nur durch den gleichen oder einen vergleichbaren Batterietyp, der auch vom Hersteller empfohlen wird. Entsorgen Sie verbrauchte Batterien bitte gemäß den Herstelleranweisungen.

Advertencia

Alimentación eléctrica • Este equipo debe conectarse únicamente a la fuente/tipo de alimentación eléctrica indicada en el mismo. La alimentación eléctrica de este equipo debe provenir de un sistema de distribución general con conductor neutro a tierra. La tercera pata (puesta a tierra) es una medida de seguridad, no puentearia ni eliminaria.

Desconexión de alimentación eléctrica • Para desconectar con seguridad la acometida de alimentación eléctrica al equipo, desenchufar todos los cables de alimentación en el panel trasero del equipo, o desenchufar el módulo de alimentación (si fuera independiente), o desenchufar el cable del receptáculo de la pared.

Protección del cables de alimentación • Los cables de alimentación eléctrica se deben instalar en lugares donde no sean pisados ni apretados por objetos que se puedan apoyar sobre ellos.

Reparaciones/mantenimiento • Solicitar siempre los servicios técnicos de personal calificado. En el interior no hay partes a las que el usuario deba acceder. Para evitar riesgo de electrocución, no intentar personalmente la reparación/mantenimiento de este equipo, ya que al abrir o extraer las tapas puede quedar expuesto a voltajes peligrosos u otros riesgos.

Ranuras y aberturas • Si el equipo posee ranuras o orificios en su caja/alojamiento, es para evitar el sobrecalientamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.

Batería de litio • Existe riesgo de explosión si esta batería se coloca en la posición incorrecta. Cambiar esta batería únicamente con el mismo tipo (o su equivalente) recomendado por el fabricante. Desachar las baterías usadas siguiendo las instrucciones del fabricante.

警告

电源 • 该设备只能使用产品上标明的电源。 设备必须使用有地线的供电系统供电。 第三条线（地线）是安全设施，不能不用或跳过 。

拔掉电源 • 为安全地从设备拔掉电源，请拔掉所有设备后或桌面电源的电源线，或任何接到市电系统的电源线。

电源线保护 • 妥善布线， 避免被踩踏，或重物挤压。

维护 • 所有维修必须由认证的维修人员进行。 设备内部没有用户可以更换的零件。为避免出现触电危险不要自己试图打开设备盖子维修该设备。

通风孔 • 有些设备机壳上有通风槽或孔，它们是用来防止机内敏感元件过热。 不要用任何东西挡住通风孔。

锂电池 • 不正确的更换电池会有爆炸的危险。必须使用与厂家推荐的相同或相近型号的电池。按照生产厂的建议处理废弃电池。

FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

The Class A limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

NOTE: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance with FCC emissions limits.

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Conventions Used in this Guide

In this user guide, the following are used:

NOTE: A note draws attention to important information.

TIP: A tip provides a suggestion to make working with the application easier.

CAUTION: A caution indicates a potential hazard to equipment or data.

WARNING: A warning warns of things or actions that might cause injury, death, or other severe consequences.

Commands are written in the fonts shown here:

```
^AR Merge Scene,,Op1 scene 1,1 ^B 51 ^W^C
```

```
[Ø1] R ØØØ4 ØØ3ØØ ØØ4ØØ ØØ8ØØ ØØ6ØØ [Ø2] 35 [17] [Ø3]
```

Esc X1 *X17* X20* X23* X21 CE←

NOTE: For commands and examples of computer or device responses mentioned in this guide, the character "Ø" is used for the number zero and "O" represents the capital letter "o."

Computer responses and directory paths that do not have variables are written in the font shown here:

```
Reply from 2Ø8.132.18Ø.48: bytes=32 times=2ms TTL=32
```

```
C:\Program Files\Extron
```

Variables are written in slanted form as shown here:

```
ping xxx.xxx.xxx.xxx –t
```

```
SOH R Data STX Command ETB ETX
```

Selectable items, such as menu names, menu options, buttons, tabs, and field names are written in the font shown here:

From the **File** menu, select **New**.

Click the **OK** button.

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Introduction

This manual contains information about the Extron MLS 608 D Series of AV switchers with instructions for experienced installers on how to install, configure, and operate it.

In this manual the terms "MLS 608 D Series switcher," "AV switcher," and "switcher" are used interchangeably and refer to any of the MLS 608 D Series models.

MLS 608 D Series Description

The MLS 608 D AV switchers are available in three models:

- MLS 608 D — a non-amplified model with variable preamp outputs.
- MLS 608 D SA — features 2-channel stereo power amplification with 20 watts rms per channel into 4 or 8 ohms.
- MLS 608 D MA — features mono 70 volt amplification with 40 watts rms output.

The MLS 608 D series are simple-to-use, eight input, multi-format switchers designed to integrate digital and analog sources. All signals are transmitted over CAT 5-type cable to the included MTP/HDMI U R Twisted Pair Receiver. The MLS 608 D Series feature Extron ProDSP™ digital audio processing, which provides an extensive array of easy-to-use tools for audio system setup and fine-tuning. The MLS 608 D Series offers digital video switching with four HDCP-compliant HDMI inputs, and analog video switching with four universal inputs, including an Extron universal MTP twisted pair input. It outputs HDMI twisted pair signals and analog MTP Twisted Pair to the included MTP/HDMI U R receiver, providing a complete digital and analog video and audio switching system.

The MLS 608 D AV switchers are ideal for classrooms and other AV environments that require the flexibility to integrate digital and analog video switching in a single switcher.

Features

- **Inputs:** Three 15-pin HD connectors – one with loop-through – for RGBHV, HDTV component video, and S-video or composite video; one universal MTP twisted pair input, four HDMI connectors; seven captive screw connectors for balanced or unbalanced stereo audio; one balanced or unbalanced mono audio input via MTP
- **Outputs:**

  MLS 608 D switcher — One buffered output on VGA connector (tied only to input 1), two balanced or unbalanced audio outputs on captive screw connectors, analog MTP video and audio output on one RJ-45 connector, digital video and RS-232 on two RJ-45 connectors, one power amplifier output (MA and SA models only).

  MTP/HDMI U R receiver — RGB on 15-pin HD, component video on BNCs, S-video on 4-pin mini DIN, composite video on BNC, HDMI connector, balanced or unbalanced audio on one captive screw connector, communications on a captive screw connector.

- **Multi-input switcher** for digital and analog video signals
- **Transmits HDMI and analog video** plus audio and RS-232 over CAT 5-type cables.
- **Includes MTP/HDMI U R Twisted Pair Receiver** — Automatically routes incoming signals to the appropriate output connectors.

- **EDID Minder®** — Automatically manages EDID – Extended Display Identification Data – communication between the display and connected VGA and HDMI input sources. EDID Minder ensures that all sources power up correctly and reliably output content, whether or not they are actively connected to the display device through the switcher outputs.
- **HDMI audio de-embedding** — Strips two-channel PCM audio off HDMI inputs, allowing for DSP processing and signal routing.
- **HDCP compliance** — The MLS 608 D switchers and the included MTP/HDMI U R device fully support switching and long distance transmission of HDCP signals.
- **Cable equalization for each HDMI input** — Actively conditions incoming HDMI signals to compensate for signal loss when using long HDMI cables, low quality HDMI cables, or source devices with poor HDMI signal output.
- **Sends 720p, 1080i, and XGA (1024x768) HDMI signals up to 200 feet (60 meters), 1080p/60 and 1920x1200 HDMI signals up to 100 feet (30 meters) with standard CAT 5e cable** — Extron STP201 Digital Twisted Pair cable provides added protection from outside interference and increases overall signal transmission distance.
- **Four input analog universal video switching** — Four universal inputs, including an Extron universal MTP twisted pair, accept RGBHV, HDTV component video, and S-video or composite video sources. The output is universal MTP twisted pair to the included MTP/HDMI U R.
- **Controllable (via TouchLink™ Control System, MediaLink® Controller, front panel buttons, or RS-232)** — The switchers can be controlled using the front panel backlit buttons or RS-232. An optional TouchLink Touchpanel Control System or MediaLink Controller may be connected to the RS-232 port to provide a simple and intuitive user interface for the MLS 608 D Switchers, and the entire room.
- **Skew equalization for MTP input and output** — Skew adjustments are stored in memory for the MTP input and output, to maintain RGB color alignment at all times.
- **Separate variable level and peaking controls for analog MTP signals**
- **Front panel control with backlit buttons** — The buttons can be custom-labeled for easy identification. Because the buttons illuminate, they are helpful for presenters in low-light environments.
- **Audio switching and output volume control** — The MLS 608 D Series features audio switching for eight input sources, and provides master volume control and muting. Three balanced or unbalanced outputs are available, two on the MLS 608 D switchers, the third on the MTP/HDMI U R. Each output can be set as variable or fixed.
- **Audio input gain and attenuation** — Gain or attenuation can be adjusted for each input to eliminate noticeable differences when switching between sources.
- **Mic/line audio matrix mixing** — The MLS 608 D switchers provide microphone bussing so that each of the two mic/line inputs can be mixed into any or all of the audio outputs.
- **Available with integrated stereo or mono 70 volt power amplifier** — The MLS 608 D SA offers a stereo power amplifier with 20 watts rms output per channel into 4 or 8 ohms. The MLS 608 D MA offers a mono 70 volt power amplifier with 40 watts rms output. Both feature an Extron exclusive, highly efficient, advanced Class D amplifier design with CDRS™ - Class D Ripple Suppression, an Extron patented technology that provides a smooth, clean audio waveform and an improvement in signal fidelity over conventional Class D amplifier designs. CDRS eliminates the high frequency switching ripple characteristic of Class D amplifiers, a source of radio frequency (RF) emissions which can interfere with sensitive AV equipment such as wireless microphones.

- **Essential audio DSP tools** — ProDSP provides an extensive array of easy-to-use, digital audio processing tools for audio system setup and fine-tuning, including audio gain, dynamics, compression, filtering, delay, microphone ducking, loudness, and feedback suppression.
- **DSP Configurator™ Software** — A powerful yet user-friendly software tool for managing all audio setup and operations of the MLS 608 D SA, it enables complete setup and configuration of digital audio processing tools on the ProDSP platform as well as microphone mixing.
- **Front panel USB configuration port** — Provides convenient access for system setup and configuration, as well as ProDSP for audio system integration.
- **Plenum rated MTP/HDMI U R receiver** — meets UL 2043 for heat and smoke release, excluding power supply
- **Rack-mountable** 2U, full rack width metal enclosure
- **Internal universal power supply** — The 100-240 VAC, 50-60 Hz, international power supply provides worldwide power compatibility.

Controlling the MLS 608 D Series Switcher

All MLS 608 D series switchers can be controlled using one or more of the following methods:

- The front panel controls.
- A computer, a TouchLink touchscreen panel, or MediaLink Controller connected to the RS-232 port. These allow creation of a simple and intuitive user interface for the MLS 608 D Switchers, and the entire room.
- The Extron Simple Instruction Set (SIS™): a set of simple keystroke commands that can be used to control the devices via a computer or similar control device connected to the RS-232 port
- DSP Configurator control software, running from a connected computer, and used for managing all audio setup and operations of the MLS 608 D Series unit. This enables complete setup and configuration of digital audio processing tools on the ProDSP platform as well as microphone mixing.

MLS 608 D SA Application Diagram

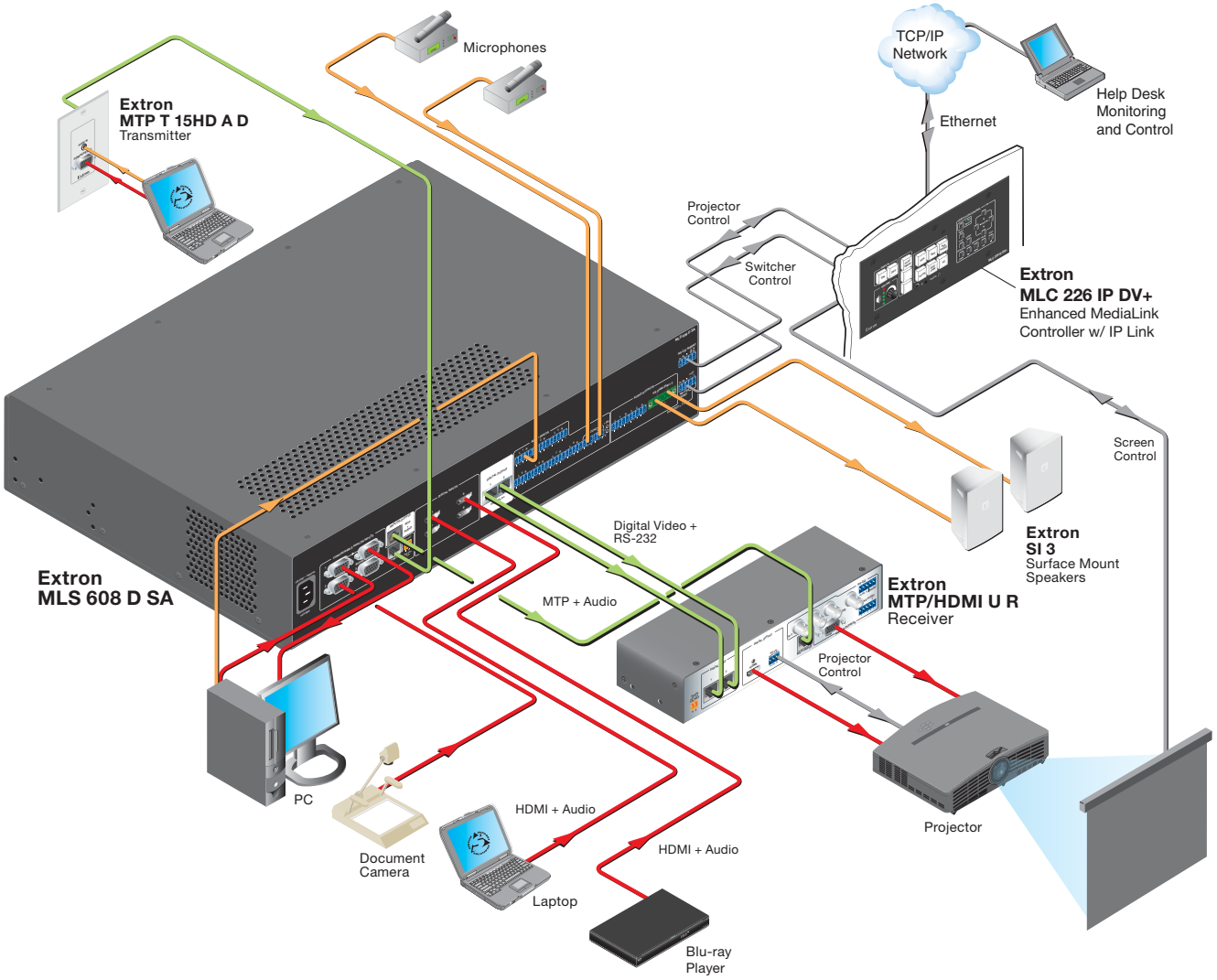


Figure 1. MLS 608 D SA and MTP/HDMI U R, with an Optional MLC 226 IP DV+

Installation

This section contains installation information for an MLS 608 D Series device and covers the following subjects:

- **UL/Safety Requirements**
- **Mounting the MLS 608 D Series Switcher**

UL/Safety Requirements

The Underwriters Laboratories (UL) requirements listed below pertain to the safe installation and operation of this AV Switcher.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Mounting the MLS 608 D Series Switchers

If the device is to be rack mounted, it may be easier to do so before cabling it, depending on the ease of access to the rear panel after mounting. Four rubber feet are included with the unit. Install the feet only if the unit is to be mounted on a tabletop (see "Tabletop placement" below).

Tabletop Placement

For tabletop placement, install the self-adhesive rubber feet/pads (provided) onto the four corners of the bottom of the device.

UL Guidelines for Rack Mounted Devices

The following Underwriters Laboratories (UL) guidelines pertain to the safe installation of the MLS 608 D Series switcher in a rack.

Elevated operating ambient temperature — If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient temperature. Therefore, install the device in an environment compatible with the maximum ambient temperature (Tma = +122 °F, +50 °C) specified by Extron.

Reduced air flow — Install the equipment in a rack so that the amount of air flow required for safe operation of the equipment is not compromised.

Mechanical loading — Mount the equipment in the rack so that a hazardous condition is not achieved due to uneven mechanical loading.

Circuit overloading — Connect the equipment to the supply circuit and consider the effect that circuit overloading might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable earthing (grounding) — Maintain reliable grounding of rack-mounted equipment. Pay particular attention to supply connections other than direct connections to the branch circuit (for example, use of power strips).

Rack Mounting

To rack mount the switcher, insert screws into the brackets and attach them to the sides of the switcher. Then secure it to the the rack (see figure below).

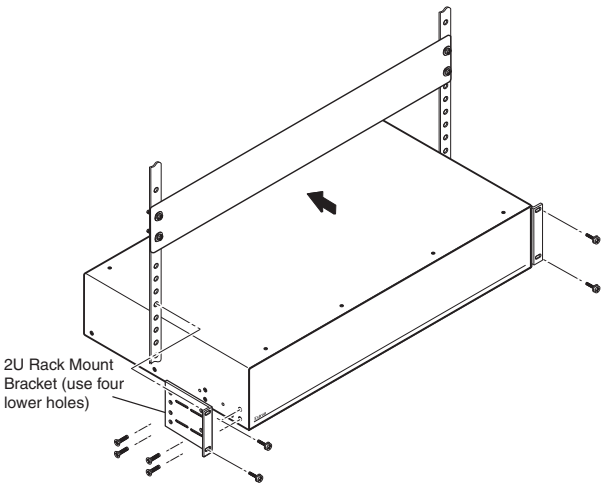


Figure 2. Mounting the MLS 608 D Series Switcher

Rear Panel Connections

This section describes the rear panel features and how to connect the cables to the MLS 608 D and to the MTP/HDMI U R as applicable.

MLS 608 D Series Rear Panel Features

This illustration shows all possible features of the MLS 608 D Series.

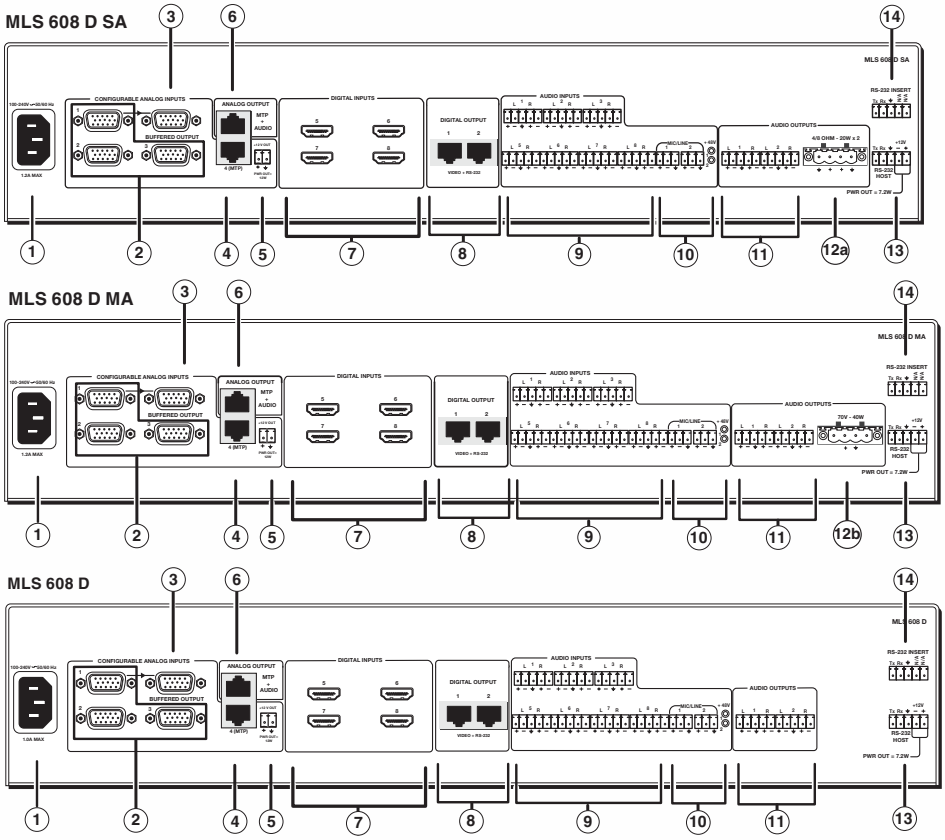


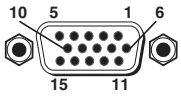
Figure 3. MLS 608 D Series Rear Panel Features

Power, analog, and digital connections		Audio and RS-232 connections	
①	AC power connector	⑨	Audio inputs, 5-pole captive screw connectors, (inputs 1-3, 5-8)
②	RGB, component/S-video/composite inputs, VGA connectors, (inputs 1-3)	⑩	Mic/Line level audio inputs (1-2), 3-pole captive screw connectors and phantom power LEDs
③	Buffered output, VGA connector (tied only to input 1)	⑪	Line level audio output, 5-pole captive screw connectors, (audio outputs 1-2)
④	Universal MTP RJ-45 connector (input 4)	⑫a	Power amplifier output connector 4/8 ohm, 20 x 2 W (SA model)
⑤	2-pole power output connector, optional MTP power source	⑫b	Power amplifier output connector 70 V, 40 W (MA model)
⑥	Analog video and audio MTP output, RJ-45 connector	⑬	RS-232 control/configuration port and +12 V power out (for optional MLC power source), 5-pole captive screw connector
⑦	Digital inputs, HDMI connectors (inputs 5-8)	⑭	RS-232 insertion port, 5-pole captive screw connector
⑧	Digital video and RS-232 outputs, RJ-45 connectors		

Power, Analog, and Digital Connections

① **Power input** — Connect the standard IEC power cord from a 100 to 240 VAC, 50 Hz or 60 Hz power source into this connector. The front panel control and input selection buttons light in sequence during power-up.

② **Inputs 1-3** — These three universal analog input ports (15-pin HD [VGA] connectors) can be configured to accept RGB (RGBHV, RGBs), component (bi- or tri-level), S-video, or composite video signals. The default setting is for RGB. The table below shows the pinouts for each format type on the 15-pin HD (VGA) connector.

Pin	RGBHV	RGBs	Component	S-video	Composite
1	Red	Red	R-Y	Chroma	
2	Green	Green	Y	Luma	Video
3	Blue	Blue	B-Y		
4	ID Bit	ID Bit			
5	N/C	N/C			
6	Red Return	Red Return	R-Y Return	C Return	
7	Green Return	Green Return	Y Return	L Return	Video Return
8	Blue Return	Blue Return	B-Y Return		
9					
10	Ground	Ground			
11	ID Bit	ID Bit			
12	ID Bit	ID Bit			
13	H Sync	C Sync			
14	V Sync				
15	ID Bit	ID Bit			

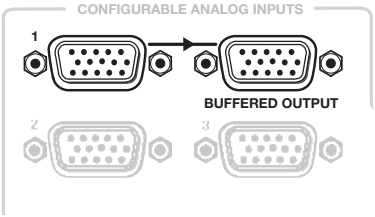
HD15 Pin Locations
Female

Plug in up to three video input sources into these VGA connectors.

From these ports, the signals are passed through to the MPT output. The ports also support RGB delay and EDID emulation.

- RGB delay — RGB delay mutes the video first, then switches the sync signals, and then switches the RGB video. This brief delay allows the display to adjust to the new sync signal before displaying the picture, providing a glitch-free switch. The delay can be set using SIS commands or the DSP Configurator software using the Video I/O workspace. RGB delay can be set from 0 to 5 seconds in 0.5-second increments.
- EDID settings — EDIDs (resolution and refresh rates) for digital inputs can be automatically assigned when connecting a display with a common resolution and refresh rate. The user can assign a different EDID, for both analog and digital inputs, using the data from an EDID table. **See the table on page 23** for EDID settings.

  The EDID can be manually assigned using SIS commands or via DSP Configurator. The default settings are 720p at 60 Hz for digital inputs, and 1024x768 at 60 Hz for analog inputs.



③ **Buffered output** — This buffered analog output is **tied only to input 1** and is a direct pass-through from any video signal, such as composite, S-video, RGBs, and YUV, that is present on input 1.

Connect a local output to this 15-pin HD (VGA) connector for a buffered analog output from input 1. The set signal type is output on the VGA connector, however, for composite, S-video, RGBs, and YUV signals, break out cables are needed when connecting a display.

④ **Input 4** — This port is used to input universal MTP video signals with mono audio support from an MTP transmitter. The input accepts composite, S-video, component (bi-level and tri-level), and RGB (RGBHV and RGBS) video signals, but does not support EDID emulation. When switching to this input, the incoming signal is passed to the MTP output. The MTP HDMI U R receiver auto-detects the incoming video signal and outputs it on the appropriate video connector.

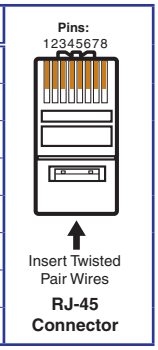
The input supports level and peaking adjustment, setting the incoming signal to appropriate levels.

Skew adjustment is available with this input, compensating for up to 64 nanoseconds of skew. Adjustments are made using DSP Configurator software or SIS commands. Settings are stored in the memory and recalled when the input is selected.

NOTE:
- See the *DSP Configurator Help File* "Video Settings" section, or the "SIS Programming and Control" section for method of skew adjustment.
- This port does not accept RS-232 commands from an MTP transmitter.

Connect to the transmitter by plugging a terminated CAT 5, 5e, or CAT 6 twisted pair cable into these RJ-45 connectors. The T568A and T568B standard pinouts are shown below. Use the same standard at both ends of the cable.

Pin	T568A Wire Color	T568B Wire Color	Composite	S-video	Component	RGBHV
1	White-green	White-orange	Reserved	Chroma +	R-Y +	Red/V. Sync +
2	Green	Orange	Reserved	Chroma -	R-Y -	Red/V. Sync -
3	White-orange	White-green	Mono Audio +	Mono Audio +	Mono Audio +	Mono Audio +
4	Blue	Blue	Video +	Luma +	Y +	Green +
5	White-blue	White-blue	Video -	Luma -	Y -	Green -
6	Orange	Green	Mono Audio -	Mono Audio -	Mono Audio -	Mono Audio -
7	White-brown	White-brown	Reserved	Reserved	B-Y +	Blue/H. Sync +
8	Brown	Brown	Reserved	Reserved	B-Y -	Blue/H. Sync -



CAUTION: Do not connect the MTP cable to any LAN port, telecommunications network, or digital video output port.
Do not connect a LAN cable to any MTP or digital video output port.

The MLS-to-MTP input and output transmission distances for CAT 5, 5e, CAT 6, and CAT 7 cable vary depending on the signal type, resolution and the quality of cable used. See **the table on page 10** for distances.

MLS 608 D Analog Signal Transmission Distance Table for Inputs and Outputs, in Feet and (Meters)

NOTE:
- The maximum transmission distances are determined by the frequency and resolution of the video signal being routed. The table below specifies the recommended maximum distances when using Extron Enhanced Skew Free AV UTP cable or UTP CAT 5, 5e, or CAT 6 cable, terminated with RJ-45 connectors.
- The minimum TP cable length should be 25 feet from the MTP Tx to input 4.
- It is possible to exceed the recommended distances; however, image quality may be reduced.

Video Format	MLS Pre-Peak		Maximum Distance			
	Off	On	High Quality		Variable Quality	
			MLS Input	MLS Output	MLS Input	MLS Output
Component, S-video	<300 (90)	>350 (105)	700 (215)	700 (215)	700 (215)	800 (245)
Composite	<300 (90)	>350 (105)	700 (215)	700 (215)	750 (230)	750 (230)
640x480	<300 (90)	>350 (105)	550 (170)	600 (185)	600 (185)	650 (200)
800x600	<300 (90)	>350 (105)	500 (150)	500 (150)	600 (185)	600 (185)
1024x768*	<300 (90)	>350 (105)	450 (135)	450 (135)	550 (170)	550 (170)
1280x960*	<300 (90)	<350 (105)	350 (105)	350 (105)	450 (135)	450 (135)
1280x1024*	<250 (75)	>300 (90)	350 (105)	350 (105)	450 (135)	450 (135)
1360x765	<250 (75)	>300 (90)	350 (105)	350 (105)	500 (150)	500 (150)
1365x768	<250 (75)	>300 (90)	350 (105)	350 (105)	450 (135)	450 (135)
1366x768	<250 (75)	>300 (90)	350 (105)	350 (105)	450 (135)	450 (135)
1440x900	<250 (75)	>300 (90)	350 (105)	300 (90)	400 (120)	400 (120)
1400x1050	<250 (75)	>300 (90)	350 (105)	300 (90)	400 (120)	400 (120)
1600x1200	<250 (75)	>300 (90)	300 (90)	300 (90)	450 (135)	450 (135)
1920x1200	<200 (60)	>250 (75)	300 (90)	250 (75)	400 (120)	400 (120)
HDTV 720p	<250 (75)	>300 (90)	400 (120)	400 (120)	500 (150)	500 (150)
HDTV 1080i	<200 (60)	>250 (75)	300 (90)	250 (75)	400 (120)	400 (120)
HDTV 1080p	<200 (60)	>250 (75)	300 (90)	250 (75)	400 (120)	400 (120)

Figure 4. Transmission Distance Table for Analog Signals

⑤ **Optional MTP power output** — This port is for use with an MTP/HDMI U R receiver, and is rated at 12 VDC with a current draw of 1 A, 12 watts.

This supplies sufficient power via the MLS device to fully power the MTP unit.

NOTE: When the power save mode is set to on, this port also turns off.

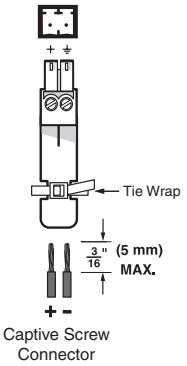


Figure 5. Wiring the MLS 608 D Power Output Connector

⑥ **Analog MTP output (audio and video)** — This output transmits signals from an active analog input over CAT 5 cable to the MTP/HDMI U R receiver. It is also capable of transmitting line level mono audio over the same cable as audio output 3.

The output also supports pre-peaking adjustment for optimizing video signals for long cable runs.

Skew adjustment is available on this ouput, compensating for up to 64 nanoseconds of skew. Adjustments are made using DSP Configurator software or SIS commands. Settings are stored in the memory and recalled when the input is selected.

Connect the MTP HDMI U R twisted pair receiver (supplied) for analog audio and video output.

NOTES: • **See the table on page 9 for pinout details**.
• **See the table on page 10 for output transmission distances.**

⑦ **Digital Inputs 5-8** — These four HDMI inputs are HDMI 1.3 compatible and have the following features:

- HDCP authentication – The MLS 608 D gives a status feedback if it detects any of the following are valid:
  - If a source is HDCP compliant
  - If a source has active video
  - If a display is HDCP compliant (only if connected input is encrypted)

  If the source is HDCP compliant but the display is not, the MLS displays a green screen at the output.

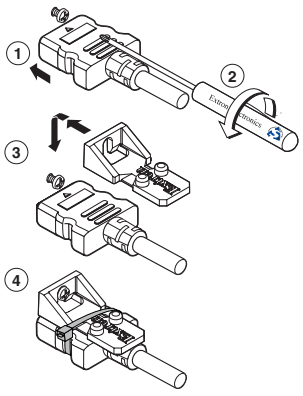
  See "HDCP Compliance" within the "DSP Configurator" section, for the detailed method of HDCP detection and operation.
- Digital input equalization — Each digital input has automatic equalization to compensate for distance from the source to the input. This gives 1080p, 8-bit color, with a maximum distance of 50 feet using Extron Pro Series HDMI cable.

  NOTE: The transmission distance varies greatly depending on the signal resolution, and on the type of cable, graphics card and display used in the system.

- Audio de-embedding — Each of the HDMI inputs de-embed 2-channel PCM audio signals at 48 Hz only. Other audio signals are not de-embedded: the signal will be muted at the DSP processor and audio will not be heard.

  The audio to be de-embeded is user selectable from either the existing embedded digital audio or a local analog input. The default is digital audio.

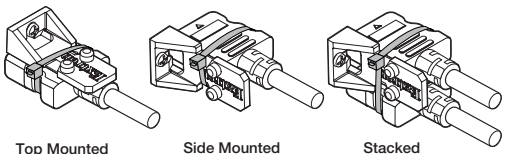
Connect up to four digital HDMI and DVD-D inputs to the HDMI connectors ⑦. Connect DVI-D sources using an adapter cable and secure the connectors to the MLS 608 D using the LockIt™ bracket as follows:



1. Plug the HDMI cable into the panel connection.
2. Loosen the HDMI connection mounting screw from the panel enough to allow the LockIt lacing bracket to be placed over it.
3. Place the LockIt lacing bracket on the screw and against the HDMI connector, then tighten the screw to secure the bracket.

4. Loosely place the included tie wrap around the HDMI connector and LockIt lacing bracket.
5. While holding the connector securely against the lacing bracket, tighten the tie wrap, then remove any excess length.

The LockIt bracket can be mounted in different orientations, as shown below.



⑧ **Digital video and RS-232 outputs —** These two RJ-45 connectors output digital video signals and RS-232 commands to the MTP/HDMI U R receiver over Extron STP 201 (recommended), CAT 5, 5e or CAT 6 cable.

The RS-232 signal is bi-directional and its source is tied to the 5-pole, captive screw, RS-232 Insert port. See the pinout table below. **See ⑭ (page 16)** for the transmission path.

Pin	T568A Wire Color	T568B Wire Color	RJ-45 #1	RJ-45 #2
1	White-green	White -orange	Data 0 +	CEC
2	Green	Orange	Data 0 -	HPD
3	White-orange	White-green	ID Clock +	Serial + (RS-232 Insert)
4	Blue	Blue	Data 1 +	DDC Clock
5	White-blue	White-blue	Data 1 -	N/A
6	Orange	Green	ID Clock -	Serial + (RS-232 Insert)
7	White-brown	White-brown	Data 2 +	DDC Data
8	Brown	Brown	Data 2 -	Ground

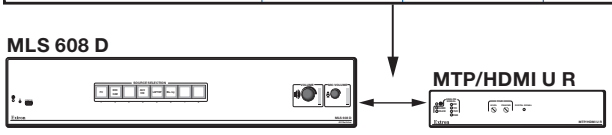
NOTE: Terminate both ends of the same cable identically, in accordance with either the TIA/EIA T568A or TIA/EIA T568B wiring standard.

Plug terminated cable from the MTP HDMI U R in to these two RJ-45 connectors for digital video and RS-232 output. Using STP201 cable is recommended.

The digital signal transmission distance is shown below.

MLS 608 D to MTP/HDMI U R
Digital Signal Maximum Transmission Distances

8-bit Color Depth			
Resolutions	**CAT 5/5e/6 Cable UTP**	**STP**	**Extron STP201 Cable**
1024x768, 720p, 1080i @ 60 Hz	200' (60 m)	200' (60 m)	200' (60 m)
1600x1200, 1920x1200, 1080p @ 60 Hz	100' (30 m)	125' (38 m)	150' (46 m)



NOTES: • Transmission distance varies greatly depending on the signal resolution, and the type of cable, graphics card and display used in the system.
• Shielded twisted pair cable provides added protection from outside interference and increases overall signal transmission distance. Extron recommends using shielded twisted pair for optimal performance.

When using STP cable, terminate the cable as follows:

1. For each cable, peel back the cable shielding from the end of the cable 7/8 inch [2.2 cm]) and fold it back.

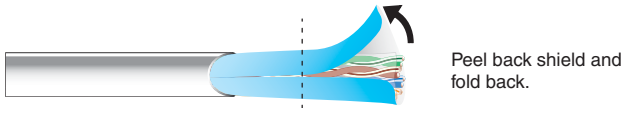


Figure 6. Peeling Back the Cable Shielding

2. Cut away and discard the clear cellophane inner wrapper from the end of the cable back to the folded-over cable shielding.
3. Peel the backing off the self-adhesive shielded aluminum tape and wrap it around the folded-over cable shielding, slightly overlapping the beginning of the tape.

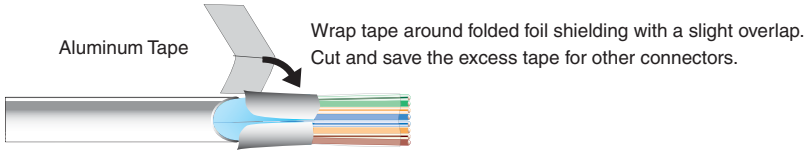

Aluminum Tape
Wrap tape around folded foil shielding with a slight overlap.
Cut and save the excess tape for other connectors.

Figure 7. Wrapping the Shielded Tape

4. Cut the unused portion of the shielded tape and retain for further uses.
5. Feed each individual wire into the appropriate slot of the RJ-45 connector and crimp the cable in the normal manner, folding the tangs at the end of the connector over the shielded tape.

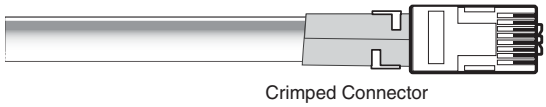


Figure 8. Crimped RJ-45 Connector

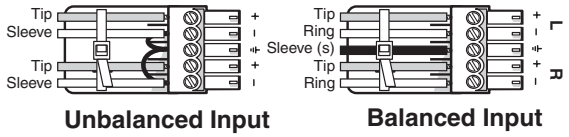
Audio and RS-232 Connections

NOTES: When wiring the connectors for the ports listed below:
- DO NOT tin the wires.
- Bare the wires to a maximum length of 3/16 inch (5 mm) only.

⑨ **Audio inputs 1-3 and 5-8** — These 5-pole captive screw connectors support analog, balanced or unbalanced, stereo audio as three line level inputs (1-3) and four line level analog stereo inputs (5-8).

Audio from the HDMI inputs 5-8 can be de-embeded from the HDMI source. This allows the user to choose to select audio either from the HDMI inputs or the analog audio from these four captive screw inputs. Once an audio source is selected, the unselected source is disabled. The default selection is audio from the HDMI inputs.

Connect audio sources to these 5-pole, captive screw connectors. Wire the connector for line level analog stereo as shown below.



Unbalanced Input **Balanced Input**

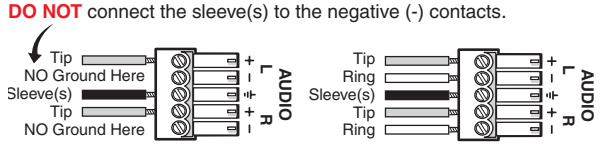
⑩ **MIC/Line level audio inputs 1-2** — These two 3-pole, captive screw connectors are microphone or line level inputs for balanced or unbalanced mono audio. They also have +48 V phantom power support and two rear panel LEDs that indicate when phantom power is activated. The phantom power can be activated through DSP Configurator. See the *DSP Configurator Help File* "Mic/Line Input Gain" section, for the method of enabling and disabling phantom power.

Connect microphone or line level audio inputs to these 3-pole, captive screw connectors. Wire the connector for mono audio as shown below.

Unbalanced Mic Input **Balanced Mic Input**

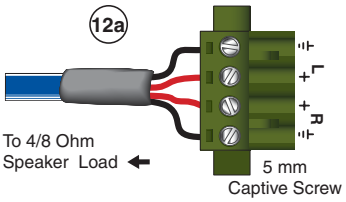
⑪ **Line level audio outputs 1-2** — Connect audio output devices to these 5-pole, captive screw connectors.
Wire the connectors for line level analog stereo output as shown below.

CAUTION
For unbalanced audio, connect the sleeve(s) to the ground contact.
DO NOT connect the sleeve(s) to the negative (-) contacts.

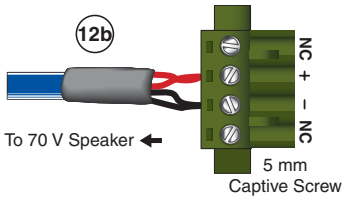


Unbalanced Output **Balanced Output**

⑫a **Power amplifier output (MLS 608 D SA)** — This model has a 2x20 watt stereo power amplifier Connect a suitable audio device for 2-channel stereo, 20 watts per channel, 4 or 8 ohm audio output. Wire the connector as shown at right



⑫b **Power amplifier output (MLS 608 D MA)** — This model has a 40 watt, 70 volt, mono power amplifier. Connect a suitable audio device for mono audio, 40 watts, 70 volt audio output. Wire the connector as shown at right.



NOTE: The MLS 608 D model has a variable preamp output with no power amplifier.

⑬ **RS-232 control and +12 VDC power output** — This port is used for configuration and control of the MLS 608 via RS-232, and for powering the control device (such as an optional MLC 226).

NOTE: The RS-232 control and +12 VDC power output port is always active, regardless of the power save mode status.

RS-232 configuration — To configure the MLS 608, connect this 5-pin connector to a PC or laptop that has DSP Configurator software installed on it.

Control via RS-232 — To control the MLS 608 via RS-232 after configuration is complete, disconnect the PC or laptop and connect a MediaLink control system (such as an MLC 226) to the RS-232 host port.

Default protocol: 38400 baud, 1 stop bit, 8 data bits, no flow control.
Wire the MLC to the MLS 608 as shown below.

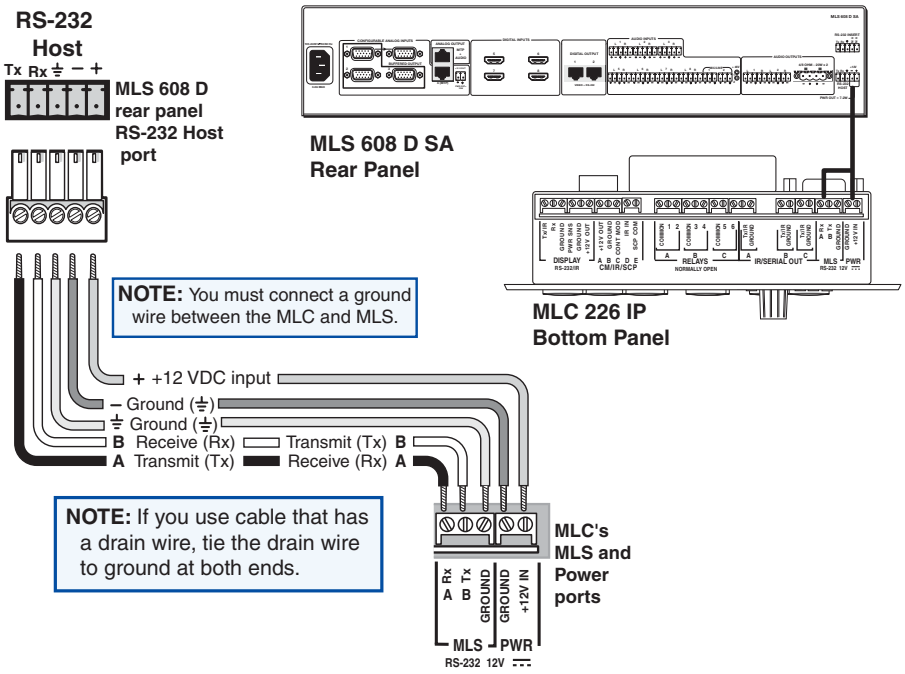


Figure 9. Wiring the MLS 608 D RS-232 Host Port to an MLC 226 IP

⑭ **RS-232 Insert** — This port is used to connect an optional control device (such as an MLC 226 IP or IP Link controller) to this port for bi-directional RS-232 communication to a display device. This insert port is tied to the MLS 608 D digital and RS 232 output ports, ⑧.

The transmission pathway is from, for example, an MLC 226 IP bi-directional RS-232 port (labelled Display) to the MLS 608 D RS-232 Insert port ⑭, out via the MLS 608 D digital outputs (**see ⑧ on page 12**) to the MTP/HDMI U receiver input port (**see Ⓑ on page 17**) and then out to the display device via the receiver's RS-232 port (**see Ⓓ on page 17**).

Wire the MLC to the MLS 608 as shown below.

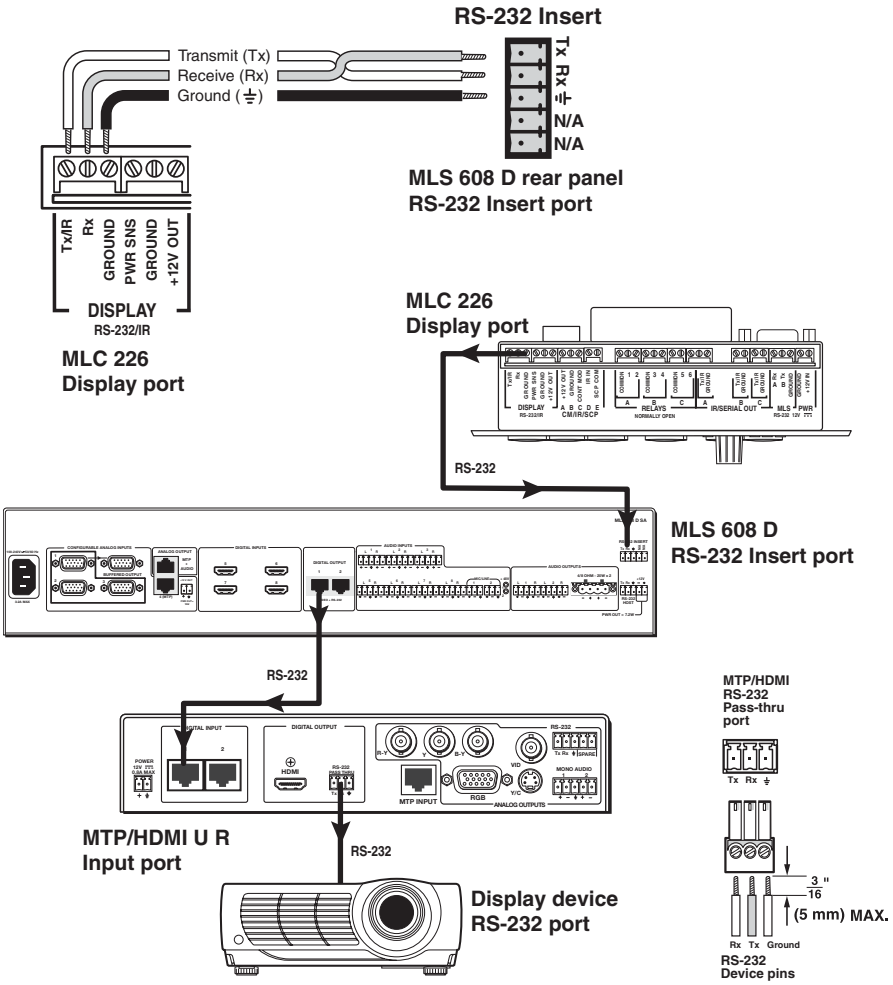
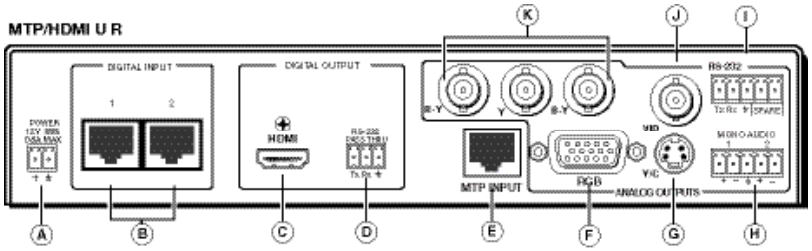


Figure 10. Wiring the MLS 608 D RS-232 Insert Port (showing RS-232 Flow Path to the Display Device)

MTP/HDMI U R Connections

The full MLS 608 D system comes with an MTP/HDMI U R receiver. To work with any of the MLS 608 D units, connect the receiver as shown below.

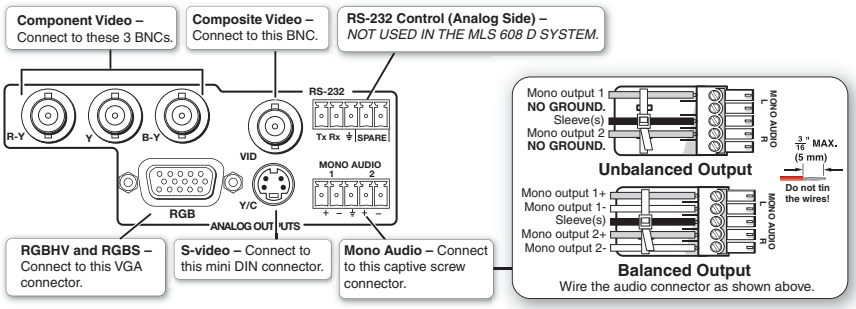


Ⓐ Power input	Ⓔ MTP input	Ⓘ RS-232 port (analog side). Not used in MLS 608 D system
Ⓑ Digital signal inputs (1 and 2)	Ⓕ RGBHV, RGBS output*	Ⓙ Composite video output*
Ⓒ Digital (HDMI) output	Ⓖ S-video output*	Ⓚ Component video (R-Y, Y, B-Y) output*
Ⓓ RS-232 pass-through connector	Ⓗ Mono audio output	* = Analog outputs

Digital video inputs — Connect the digital video and RS-232 outputs 1 and 2 from the MLS 608 D (**see Ⓑ on page 12**) using CAT 5, 5e, or 6 twisted pair cabling to the MTP/HDMI UR receiver inputs 1 and 2 (see Ⓑ above).

Digital video output — Connect a display to the HDMI connector Ⓒ for digital video output.

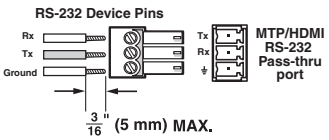
Analog video — Connect the analog video outputs Ⓕ, Ⓖ, Ⓙ, and Ⓚ, as shown below:



Audio — Connect a suitable audio device, such as powered speakers, to the 5-pole captive screw audio output connector Ⓗ for a balanced or unbalanced, dual mono audio signal. Wire connector as shown above.

NOTE: The audio signal is detected on the MTP input and then is distributed to the audio connector for output.

RS-232 control (digital side) — Connect a serial communications port on a display device to the 3.5 mm, 3-pole captive screw connector Ⓓ (labeled RS-232 pass-thru) for pass-through RS-232 bidirectional communication. Wire the connector as shown at right.



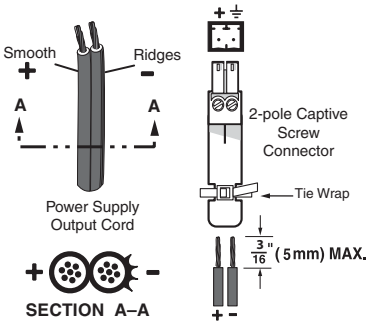
NOTE: RS-232 control port on the analog side is not used in the MLS 608 D system.

Power connection — Connect the 2-pole 3.5 millimeter captive screw connector from the 12 VDC, 1.0 A external power supply (provided) to this receptacle Ⓐ on the rear panel. Ensure the connections have the correct polarity.

CAUTION: Always use a power supply supplied or specified by Extron. Use of an unauthorized power supply voids all regulatory compliance certification and may cause damage to the supply and the end product. Unless otherwise stated, the AC/DC adapters are not suitable for use in air handling spaces or in wall cavities. The installation must always be in accordance with the applicable provisions of National Electrical Code ANSI/NFPA 70, article 75 and the Canadian Electrical Code part 1, section 16. The power supply shall not be permanently fixed to building structure or similar structure.

Alternatively, connect to the 2-pole power connector on the MLS 608 D (**see Ⓢ on page 10**).

See the figure at right showing how to wire the connector.



CAUTIONS: Power supply voltage polarity is critical. Incorrect voltage polarity can damage the power supply and the unit. The ridges on the side of the cord identify the power cord negative lead.
The length of the exposed (stripped) copper wires is important. **The ideal length is 3/16 inch (5 mm)**. Longer bared wires can short together. Shorter wires are not as secure in the connectors and could be pulled out.

To verify the polarity before connection, plug in the power supply with no load and check the output with a voltmeter.

WARNING: The two power cord wires must be kept separate while the power supply is plugged in. Remove power before wiring.

NOTE: Do not tin the power supply leads before installing them in the direct insertion connector. Tinned wires are not as secure in the connectors and could be pulled out.

When power is applied the front panel power LED lights.

Power Save Mode

Power Save mode is a feature on the MLS 608 D that will help conserve energy and reduce costs by placing the unit into a standby state. The switcher does not have an auto-power down feature (like the one used on the XPA 1002, for example), and can only be placed into the standby state via an SIS command. Sending the SIS command Esc**1PSAV**↵ turns on the power save mode.

When Power Save mode is enabled the switcher draws less than 4 watts, the front panel buttons and volume indicators are off, and the front panel power LED is amber, indicating that the switcher is in the standby state.

The switcher can be "woken" up with an SIS command (Esc**0PSAV**↵), or by pressing any front panel button or turning any encoder/knob. This reverts the switcher to the normal mode (power save off).

When in its normal state, the front panel buttons and volume indicators are lit and the power LED indicator is green.

NOTES:
- If the switcher is in the standby state, and power is re-cycled on the unit, it powers back up into the normal state, and not into the standby state.
- The switcher is not ENERGY STAR® qualified.

Operation

This section of the manual discusses the operation of an MLS 608 D device, and is divided into four sections:

- **Front Panel Features and Operation**
- **Using EDIDs**
- **Optimizing Audio — An Overview**
- **Optimizing Video — An Overview**
- **Firmware Upgrades**

Front Panel Features and Operation

All MLS 608D models have the same front panel configuration.

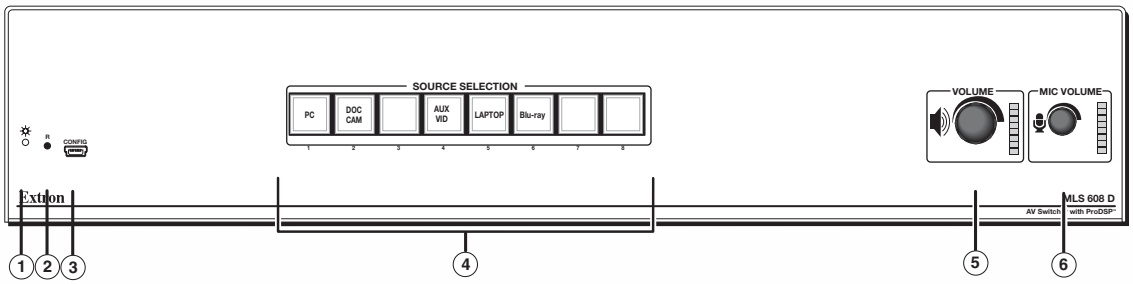


Figure 11. MLS 608D Device Front Panel Features

①	Power and reset status LED	④	Source selection buttons
②	Reset button	⑤	Volume control knob
③	Front panel mini USB configuration port	⑥	Mic volume control knob

① **Power/reset status LED** — This LED lights green when power is applied, and amber when in power save (standby) mode.

It also indicates reset mode when the reset button is pressed (see method below).

② **Reset button** — Press and hold this recessed button to reset the MLS switcher to one of the two available reset mode: modes 1 and 5.

Reset as follows:

Mode 1 — Revert to factory firmware version where incompatibility issues occur with user loaded firmware.

To reset temporarily to the factory default firmware, press and hold in the reset button while applying power to the unit.

NOTES:
- After a Mode 1 reset, update the firmware to the latest version. **DO NOT** use the factory firmware resulting from the reset. Factory firmware must be re-uploaded if that is the version to be used.
- If you do not want to update the firmware, recycling the power reinstates the firmware version used before the Mode 1 reset.

Mode 5 — Reset the MLS 608 D to factory default (except firmware).

To reset the device to factory defaults (with the exception of the firmware), press and hold in the reset button for approximately 9 seconds, until the LED blinks three times (once at 3 seconds, once at 6 seconds, and once again at 9 seconds).

Release and within 1 second press the reset button once (<1 second).

NOTES: Nothing will happen if the momentary press is not made within 1 second.

This reset is equivalent to the SIS reset command Esc ZQQQ.

③ **Front panel configuration port** — This port is used for MLS 608 D configuration and firmware upgrades.
Connect a computer to this mini USB port (cable not supplied) for configuration and control using DSP Configurator software or SIS commands.

For firmware upgrades use the Firmware Loader Software. **See "Firmware Upgrades"** later in this chapter for method.

④ **Source selection buttons** — These eight buttons are used to select between any of the eight inputs. The button lights amber when selected, and can be configured to show an input number, icon, or device name as desired using the supplied button labels.

Alternatively, these buttons can be labeled as required. See the "Button Labeling" section for details.

⑤ **Program volume adjustment knob** — This knob is assigned to Group Master 1, which controls program outputs 1, 3, and 4 (MA and SA models only), post switcher, pre-mic mixing programs. By default it controls the volume of the three program outputs together.

NOTE: By default, program output 2 has a fixed output level.

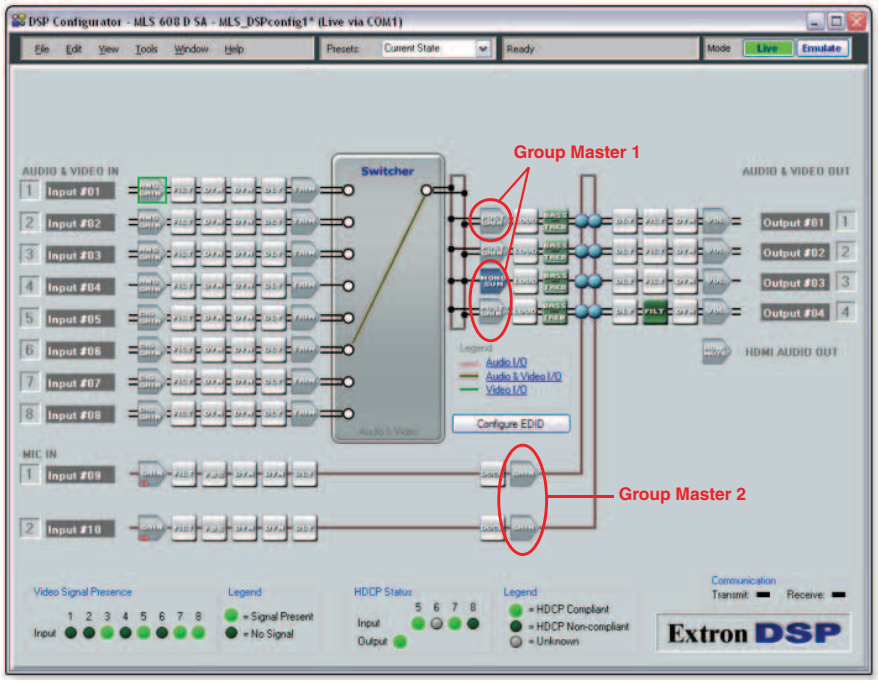
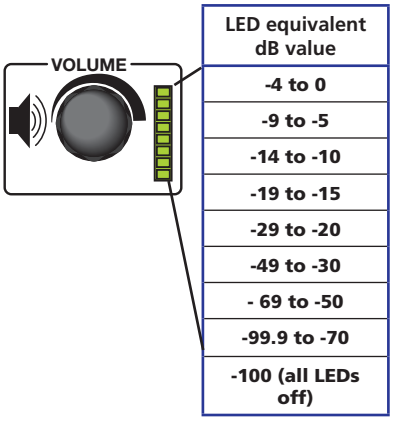


Figure 12. Group Masters 1 and 2 Assigned to Front Panel Adjustment Knobs

Use this volume adjustment knob to set or adjust the program output volume (attenuation, from -100 dB to 0 dB) as desired. The LEDs indicate the overall percentage level for Group Master 1; the volume level being all off (0%) at -100 dB through to all on (100%) at -4 to 0 dB. Any level changes made do not affect the mic audio.

Rotate the knob clockwise to increase volume, counter-clockwise to decrease volume. The corresponding LEDS light as the knob is rotated. See the table at right for LED/dB values.



Volume control of Group 1 individual program outputs (programs 1, 3, or 4) can be made through DSP Configurator software. Group 1 can be reconfigured through DSP Configurator software.

⑥ **Mic volume adjustment knob** — This knob is assigned to Group Master 2, which controls the mic inputs at the second gain block, pre-mic mixer-gain programs (**see figure 12**). By default it controls both microphones, and level changes do not affect the program audio.

Use this knob to set or adjust the two MIC volumes as desired from -100 dB to 0 dB. The LEDs indicate the volume level. See the table at above right for LED/dB values.

Rotate the knob clockwise to increase volume, counter-clockwise to decrease volume. The corresponding LEDS light as the knob is rotated.

Volume control of Group 2 individual mic levels (mic pre-mixer gains 1 and 2) can be made through DSP Configurator software.

Group 2 can be reconfigured through DSP Configurator software.

NOTE: The program and mic volume settings and adjustments can also be made using Extron DSP Configurator program or by Simple Instruction Set (SIS) commands. See the "**Using the DSP Configurator Software**"section and the "**SIS Programming and Control**" section for details.

Using EDIDs

EDID Minder

This pre-installed feature ensures that all sources power up properly and reliably output content for display. EDIDs (resolution and refresh rates) for digital inputs can be automatically assigned when connecting a display with a common resolution and refresh rate. For both analog and digital, the user can assign a different EDID from an EDID table.

A different EDID (as given in the table on the next page), can be manually assigned using SIS commands or via DSP Configurator.

For the MLS 608 D units, the default settings are 1024x768 at 60 Hz for analog inputs, and 720p at 60 Hz, 2-channel PCM audio for digital inputs.

NOTES: • To work with the EDID Minder, update the EDID table, and import or export EDID data, the MLS 608 D must be connected in Live mode.

EDID Resolution/Refresh Rate Combination with SIS Variables (where X21 = 1 through 64)*					
Digital Signal			Analog Signal		
Resolution	Refresh Rate (Hz)	SIS value for X21	Resolution	Refresh Rate (Hz)	SIS value for X21
Automatic Mode (digital only)		0	800x600	60	29
800x600	60	1	1024x768 **(default)**	60	30
1024x768	60	2	1280x768	60	31
1280x768	60	3	1280x800	60	32
1280x800	60	4	1280x1024	60	33
1280x1024	60	5	1360x768	60	34
1360x768	60	6	1366x768	60	35
1366x768	60	7	1440x900	60	36
1440x900	60	8	1400x1050	60	37
1400x1050	60	9	1600x1200	60	38
1600x1200	60	10	1680x1050	60	39
1680x1050	60	11	1920x1200	60	40
1920x1200	60	12	576p	50	41
576p, 2-ch PCM Audio	50	13	480p	60	42
480p, 2-ch PCM Audio	60	14	720p	50	43
576p, Multi-ch Audio	50	15	720p	60	44
480p, Multi-ch Audio	60	16	1080i	50	45
720p, 2-ch PCM Audio	50	17	1080i	60	46
720p, 2-ch PCM Audio **(default)**	60	18	1080p	50	47
720p, Multi-ch Audio	50	19	1080p	60	48
720p, Multi-ch Audio	60	20	User Loaded #1		49
1080i, 2-ch PCM Audio	50	21	User Loaded #2		50
1080i, 2-ch PCM Audio	60	22			
1080i, Multi-ch Audio	50	23			
1080i, Multi-ch Audio	60	24			
1080p, 2-ch PCM Audio	50	25			
1080p, 2-ch PCM Audio	60	26			
1080p, Multi-ch Audio	50	27			
1080p, Multi-ch Audio	60	28			
User Loaded #3		51			
User Loaded #4		52			
800x600, 2-ch PCM Audio	60	53			
1024x768, 2-ch PCM Audio	60	54			
1280x768, 2-ch PCM Audio	60	55			
1280x800, 2-ch PCM Audio	60	56			
1280x1024, 2-ch PCM Audio	60	57			
1360x768, 2-ch PCM Audio	60	58			
1366x768, 2-ch PCM Audio	60	59			
1440x900, 2-ch PCM Audio	60	60			
1400x1050, 2-ch PCM Audio	60	61			
1600x1200, 2-ch PCM Audio	60	62			
1680x1050, 2-ch PCM Audio	60	63			
1920x1200, 2-ch PCM Audio	60	64			

* See the "**SIS Programming and Control**" section for full details and use of SIS variables.

NOTE: EDIDs values 53 though 64 are available only with firmware 1.03 or higher.

Figure 13. EDID Table with SIS Commands

Automatic EDID Mode (digital output only)

In this mode, if no displays are connected, the default EDID (720p @ 60 Hz, with 2-channel PCM audio support) is present as the native resolution at each HDMI input. When a display is connected to the digital output, the EDID of that display is automatically read and stored, and the default EDID is overwritten for each HDMI input. The reading and storage of the new data is triggered by the Hot Plug Detect signal (HPD) the moment the display is detected. The stored data remains present even after the display is removed.

When a display with a different EDID is connected, or a user assigned EDID is chosen, the HDP triggers a new data overwrite for all the digital inputs.

NOTE: The Hot Plug Detect (HDP) signal triggers on all digital inputs simultaneously whenever a stored EDID is updated regardless whether it is by an automatic or user assigned EDID. This allows the source to restart the EDID read and verify the HDCP authentication process.

User Assigned EDID Mode

In this mode the EDIDs can be chosen (by the user) from the table and can be assigned to each input group (VGA and HDMI). Within this mode, the user EDID can be factory loaded (**see EDID table on page 22**) or user loaded. For user loaded EDIDs these can be either analog or digital EDIDs.

User Loaded EDID – Analog

The EDID of a display connected to the local (VGA) Buffered Output connector (**see ③ on page 9**) can be read and stored to the analog User Loaded spaces 1 or 2 (SIS values 49 and 50, see figure 14). This analog output EDID can later be recalled as the user assigned analog EDID for inputs 1through 3.

To save the analog output EDID information to the User 1 or User 2 location in the EDID table:

1. Connect the display to the local analog output on the MLS 608 D Series switcher.
2. Start DSP Configurator, if it is not running already, and connect to the device in the Live mode.
3. From the **Tools** menu, select **Configure EDID** to open the EDID Configuration dialog box.

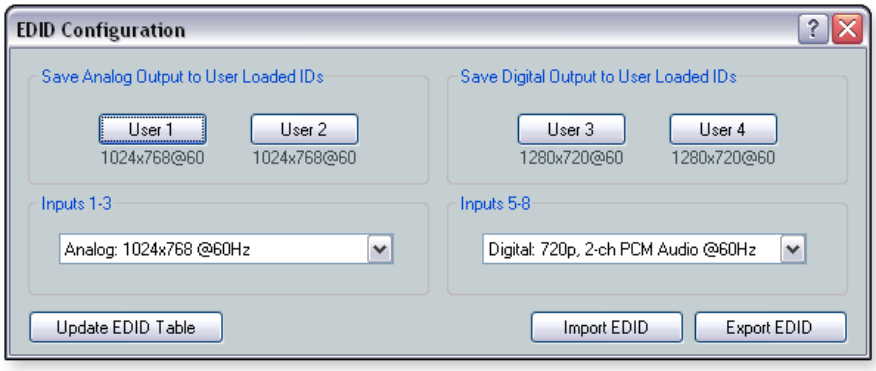


Figure 14. EDID Configuration Dialog Box

4. In the Save Analog Output to User Loaded IDs section, click the **User 1** or **User 2** button. This saves the EDID information from the analog output to the associated location (User 1 or User 2). The saved resolutions and refresh rates are now available as User 1 and User 2 options in the Inputs 1-3 section.

User Loaded EDID – Digital

The EDID of a display connected to the HDMI output of the MTP/HDMI U R receiver (see © on page 17) can be read and stored to the digital user loaded spaces 3 or 4 (SIS values 51 and 52, see figure 14). This can be recalled later as the user assigned EDID.

To save the digital output EDID information to the User 3 or User 4 location in the EDID table:

1. Connect the display to the digital output on the MTP/HDMI U R receiver.
2. Start DSP Configurator, if it is not running already, and connect in the Live mode .
3. From the **Tools** menu, select **Configure EDID** to open the EDID Configuration dialog box (see figure 14).
4. In the Save Digital Output to User Loaded IDs section, click the **User 3** or **User 4** button. This saves the EDID information from the digital output to the associated location (User 3 or User 4). The saved resolution and refresh rate are now available as User 3 and User 4 options in the Inputs 5-8 section.

Importing EDID Data

EDID data files (previously saved as BIN files) can be imported using DSP Configurator software. This enables the user to use a previously saved file, for example a specific customized EDID, that has been saved on a PC or laptop. The file is uploaded to one of the four user loaded spaces, depending on if it is an analog or digital EDID, and then it can be assigned to the relevant inputs.

To import EDID data to one of the four user loaded spaces:

1. Ensure the PC or laptop has the relevant file on it and is connected to the MLS 608 D.
2. Start DSP Configurator, if it is not running already and connect in the Live mode.
3. From the **Tools** menu, select **Configure EDID** to open the EDID Configuration dialog box (see figure 14).
4. Click the **Import** button. The import dialog box opens.
5. Select the relevant user loaded button, depending if it is an analog or digital EDID.
6. Browse to where the file (xx.BIN) is located.
7. Select the file and click **OK**.

Exporting EDID Data

EDID data files can be exported using DSP Configurator software so that the data within the file can be stored for use on another device, viewed, printed, or examined block by block for troubleshooting purposes for example, in EDID Manager software.

To export EDID data:

1. From the **Tools** menu, select **Configure EDID**. The EDID Configuration dialog box opens.
2. Click **Export EDID**. The Export EDID dialog box opens (see figure below).

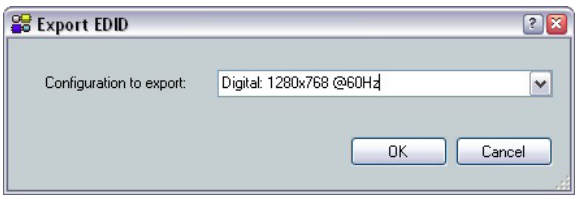


Figure 15. Export EDID Dialog Box

3. From the **Configuration to export** drop-down list, select the desired EDID configuration to export. This can include EDID information that is stored at one of the available user-defined locations.
4. Click **OK**. The Save As dialog box opens.
5. Navigate to the location where the configuration is to be saved.
6. In the **File name** field, enter a name for the file or leave the original file name.
7. Click **Save**. EDID Configuration files are saved with a BIN extension.

Updating the EDID Table

The table of default EDID resolutions for your software can be updated so the user has the most current EDID table. The available resolutions are dependent on the installed firmware version. To obtain the most current EDID table, ensure that the latest firmware version is installed on the device. To access the Download Center for information regarding the latest firmware, visit **http://www.extron.com/firmware.**

To update the EDID table:

1. From the **Tools** menu, select **Configure EDID**. The EDID Configuration dialog box opens.
2. Click **Update EDID Table**. The Download Updated EDID Table dialog box opens.

Figure 16. Download Updated EDID Table Dialog Box

3. If using a proxy server, select the **Use Proxy Server** check box. Then, enter the proxy server address in the **Proxy Server** field.
4. Click **Download**. This checks the Extron website for an updated EDID resolution table based on the firmware version of the connected device.
   - If an updated EDID table is available, a dialog box opens, notifying you that the existing EDID resolution table has been updated successfully.
   - If the existing EDID table is current, a dialog box opens confirming this.
   - If DSP Configurator is unable to check for updates to the EDID table, a dialog box opens notifying you that there is an error in downloading the file.

5. In the dialog box that opens, click **OK**.

NOTE: The update compares the existing table data with that on file and then adds any new resolutions and refresh rates to the existing table. It does not change or delete any user loaded data files that have been added to the existing table.

Once the table is updated, the new EDIDs can be assigned to the relevant inputs as desired.

Optimizing Audio — An Overview

Audio optimization is performed using the DSP Configurator application. The application provides audio level and DSP processing controls that include audio gain, dynamics, filtering, delay, ducking, and feedback suppression, essential for setting up and configuring audio systems.

When configuring an MLS 608 D Series device, DSP Configurator has four workspaces from which you can configure and view processing blocks, mix-points, and audio and video ties in the system. DSP Configurator defaults to the Audio & Video I/O workspace when the application launches. You can access the workspaces using:

- **View menu** — From the **`View`** menu, select a workspace shown in the list (**`Audio & Video I/O, Audio I/O,`** or **`Video I/O,`** or **`Console View`**).
- **Function keys** — Use the <F2> (for Audio & Video I/O workspace), <F3> (Audio I/O workspace), <F4> (Video I/O workspace), and <F5> (Console View workspace) keys.
- **Hyperlinks** — From the Legend section of the GUI (graphical user interface), click a workspace hyperlink.

Workspaces

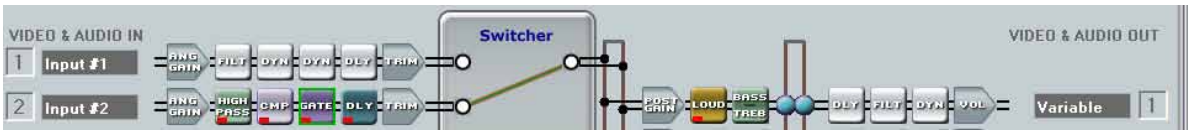
The four workspaces are:

- **Audio & Video I/O workspace** — The following areas are available for configuration:
  - Switcher in follow mode
  - Audio gain, trim, and volume controls
  - Audio DSP processors
  - Microphone mixer matrix
  - Presets (building and saving)
- **Audio I/O workspace** — The following areas are available for configuration:
  - Switcher in audio breakaway mode
  - All audio gain, trim, and volume controls
  - Audio DSP processors
  - Microphone mixer matrix
  - Presets (building and saving)
- **Video I/O workspace** — The following areas are available for configuration:
  - Switcher in video breakaway mode
  - RGB delay and video mute for computer inputs
  - MTP input and output control
  - Format selection and video mute for video inputs
  - Presets (building and saving - ties only)
- **Console View workspace** — This workspace provides an overview of all input and output activity. From this view you can access a meter bridge and level controls for input and output gain points plus the primary mix matrix.

NOTE: See the "Workspaces Overview" section in the MLS 608 D Series book in the *DSP Configurator Help File*, for more information about these workspaces.

DSP Signal Chain

The DSP signal chain is in a fixed order and each processor block inserts only one category of processor. However, the signal chain is also flexible in that a variety of processor types can be inserted per processor category.



Processor blocks are placed in the signal chain pre- and post-switcher to perform specific tasks. There are level control blocks, signal processor blocks, and mix-point blocks (with level control).

Processor blocks

Processor blocks, though performing different functions, have several common elements.

- **Insert —** All blocks (except level controls) may be inserted by right-clicking on the desired box and selecting from the context menu or by double-clicking and selecting.
- **Remove a process —** Active processors can be removed by right-clicking on the box and selecting **`Delete`** or by selecting the block and pressing <Delete> on the keyboard. An active processor may be replaced by right-clicking and inserting a new processor. A warning will appear to indicate the previous processor is about to be replaced.
- **Mute —** When a level block (gain, trim or volume) is muted, all signal flow is blocked. When mute is active a red mark appears in the lower left of the block. Mix-point mute is indicated by shadowing the mix-point.
- **Bypass —** When bypass is active, signal flow passes through the block without processing, regardless of the settings. When bypass is removed, the signal will be processed according to the parameter settings. A red mark appears in the lower left of the block (shown below) to indicate it has been inserted, but is currently bypassed.

Line input processor blocks

Pre-switcher input signal chain elements shown above, from left to right, are as follows: ① Gain, ② Filter, ③ Dynamics (1), ④ Dynamics (2), ⑤ Delay, ⑥ Trim

① **Gain (GAIN)** — Each line input channel GAIN block opens a Stereo Line Gain dialog, with the exception of input 4, which opens a Mono Line Gain dialog. The Stereo Line Gain dialog provides stereo left-channel and right-channel faders. The Mono Line Gain dialog provides a mono fader. Each fader control has a range of -18 dB to +24 dB and a level setting text field is located below the fader.

Left-channel and right-channel Mute buttons independently mute the left and right channels to the stereo bus. As a mono channel, the input 4 Mono Line Gain dialog has a single Mute button.

NOTE:
- Inputs 1 through 4 are analog (ANG GAIN block).
- Inputs 5 through 8 are digital (DIG GAIN block) but can be configured to accept either a digital (default) or an analog 2-channel input stream.
- Input 4 is a mono input.

② **Filter (FILT)** — Up to three frequency filters can be inserted in any combination of High Pass, Low Pass, Bass & Treble filters, or Parametric Equalizer.

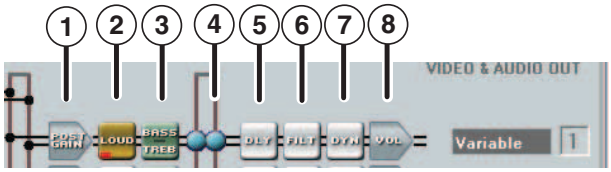
③ **Dynamics 1 (DYN)** — Dynamics processors vary the dynamic level, (the range of loudest to softest signals). Choices include AGC, compressor, limiter, or noise gate.

④ **Dynamics 2 (DYN)** — A second dynamics processor can be inserted from a choice of AGC, compressor, limiter, or noise gate.

⑤ **Delay (DLY)** — Delay can be set either by time or distance. Distance can be expressed in either feet or meters. The default setting is delay by time, at 100.0 ms. When **`Feet`** or **`Meters`** is selected, the **`Temperature`** field is enabled and can be set to either **`Celsius`** or **`Fahrenheit`**.

⑥ **Trim (TRIM)** — Each input channel trim block provides left-channel and right-channel faders or a mono fader (for input channel 4). Each fader has a gain range of -12 dB to +12 dB and the default setting is unity gain (0.0 dB).

Output processor blocks



Post-switcher output signal chain elements shown above, from left to right, are as follows: ① Post gain, ② Loudness, ③ Bass and Treble, ④ Mix-point gain, ⑤ Delay, ⑥ Filter, ⑦ Dynamics, ⑧ Volume

① **Post Gain (POST GAIN)** — An output channel post gain block provides gain control, mute control, and the ability to sum the stereo signal to mono.

The default setting for all channels is unity gain (0.0 dB), with the exception that the MTP output (output 3) default setting is -6.0 dB. Since the MTP output is a mono output and the switcher is stereo, the MTP output channels must be summed to mono. Summing to mono causes a gain increase of 6 dB, so -6.0 dB is applied to offset that gain increase.

② **Loudness (LOUD)** — The Loudness processor applies a filter compensation curve to the signal in an inverse relationship to the output volume (the higher the output volume, the less compensation that is applied).

③ **Bass and Treble (BASS TREB)** — This processor is located post-switcher and before the mix-points in the DSP signal chain for each output. The settings for these bass and treble processors can be overwritten or returned to the default values. These blocks cannot be removed from the signal chain. Group Master 3 is pre-configured to control bass/cut, while Group Master 4 is pre-configured to control treble.

④ **Mix-point Gain** — Each of the two mic/line inputs is connected to a mix-point for each of the outputs. Mic mix levels are set relative to the source program material connected to the output via the switcher and also relative to other microphones. The default setting for mic mix-points is muted with unity gain (0.0 dB).

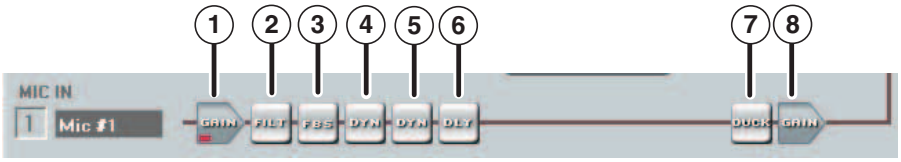
⑤ **Delay (DLY)** — Channel delay can be set by feet or meters modified by an air temperature parameter, or by direct time insertion from 0 - 200 ms.

⑥ **Filter (FILT)** — Up to nine frequency filters can be inserted in any combination of high pass, low pass, tone (bass and treble shelving), or parametric.

⑦ **Dynamics (DYN)** — A single dynamics processor can be inserted from a choice of AGC, compressor, limiter, or noise gate.

⑧ **Volume (VOL)** — Left and right faders adjust stereo output volume from -100 to 0 dB and includes a mute control. A polarity switch (+/-) is provided and a meter displaying output audio level in dBFS (decibels relative to full scale).

Mic Input processor blocks



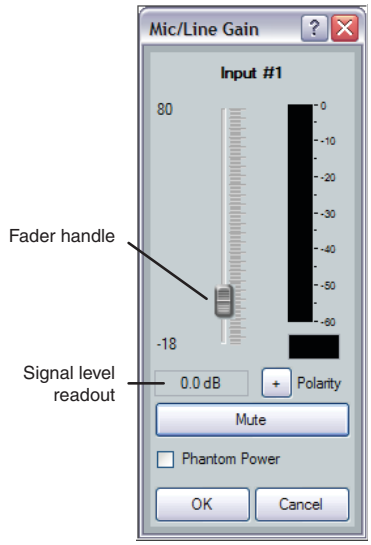
Mic/Line input signal chain elements shown above, from left to right, are as follows: ① Mic/line input gain, ② Filter, ③ Feedback supressor, ④ Dynamics, ⑤ Dynamics, ⑥ Delay, ⑦ Ducking, ⑧ Pre-mixer gain

① **Mic/Line Input Gain (GAIN)** — Mic/Line input gain control provides a gain range of -18 dB to +80 dB. Adjustments are made using the slider or entering the target dB level into the dB field (see image at right).

② **Filter (FILT)** — Up to five frequency filters can be inserted in any combination of high pass, low pass, tone (bass and treble shelving), or parametric.

③ **Feedback Suppressor (FBS)** — Provides 15 dynamic filters and 5 fixed filters for effective feedback control (primarily of microphone inputs).

④ **Dynamics (DYN)** — A single dynamics processor can be inserted from a choice of AGC, compressor, limiter, or noise gate.



⑤ **Dynamics (DYN)** — A single dynamics processor can be inserted from a choice of AGC, compressor, limiter, or noise gate.

⑥ **Delay (DLY)** — Channel delay can be set by feet or meters modified by an air temperature parameter, or by direct time insertion from 0 - 200 ms.

⑦ **Ducking (DUCK)** — Mic ducking can be set up using the ducking dialog box. This lowers the level of microphones and program material (based on a source signal from another microphone) for the duration of the signal that is present at the source microphone.

⑧ **Pre-Mixer Gain (GAIN)** — Pre-mixer matrix gain control with a range of -100 to +0 dB.

Building Blocks — An Overview

Extron building blocks are a quick configuration tool that can significantly reduce device configuration time. A building block is a collection of processor and gain settings for a particular portion of the signal chain. This allows configuration of an entire mic input, line input, or line output channel with just two clicks.

A comprehensive set of pre-configured building blocks is placed on your computer system as you install DSP Configurator. If you are new to DSP processing, these building blocks may give you all that you need for complete configuration of your Extron DSP product.

The pre-configured building blocks can also be used as a starting point, giving you a basic device setup while staging an installation, then fine-tuning the system during commissioning in the field. Building blocks can be modified, then saved, allowing you to create a customized set of tools unique to your needs. Alternatively, building blocks can be built from a blank screen or an existing configuration, allowing you total flexibility in how you create and deploy this useful and time saving feature.

Microphone building blocks

Extron building blocks for microphones set the gain level for a specific brand name and model, and turn on phantom power if required for that mic. An high pass filter is inserted to compensate for common microphone problems such as low frequency noise (thumping) or "plosives" (popping). A bass and treble shelving filter is also inserted into the filter block, with gain level set to 0 dB. This allows adjustment of the microphone tone, if necessary, either via the DSP Configurator software or by programming the gain parameters into a control system and allowing the user to make adjustments. Finally, a compressor is inserted into a dynamics processing block, applying light compression to the channel for the purpose of both normalizing diverse signal levels and protecting the system. Compressor threshold is set at -12 dBFS with soft knee control added, with a 2:1 compression ratio. The compressor threshold is above target level so as not to affect unity gain (at the target level) through the system.

Gain levels used are based on several factors:

- Reference sound pressure level (SPL) level (from the talker) at 1 meter
- Distance of talker from microphone
- Microphone sensitivity (provided by the manufacturer)
- Target channel level

The table below shows different microphone categories, the reference SPL level at the mic (talker level), mic distance used for that category, and the target channel level. The reference SPL level used accounts for a heightened level produced by a loud talker at 74 dBSPL (based on 65 dBSPL to 68 dBSPL being a normal talking level at 1 meter). A loud talker level was chosen to ensure that all microphone inputs have sufficient headroom.

The target channel level is +4 dBu, which allows for sufficient headroom. +4 dBu on the channel displays a meter level of -17 dBFS. Given the maximum output level of +21 dBu for the device, 0 dBFS is equal to +21 dBu. Therefore a level of -17 dBFS equals +4 dBu (+21 dBu - 17 dB = +4 dBu). When the target level is achieved at the input, maintaining unity gain through the system produces +4 dBu at the output.

Microphone Type	Reference Level	Source Distance	Target Level
Lectern - Goosenecks	74 dBSPL	1 foot	-17 dBFS (+4 dBu)
Table Mics - Boundary	74 dBSPL	2 feet	-17 dBFS (+4 dBu)
Table Mics - Goosenecks	74 dBSPL	2 feet	-17 dBFS (+4 dBu)
Ceiling Mics	74 dBSPL	5 feet	-17 dBFS (+4 dBu)
Handheld Mics	74 dBSPL	0.5 feet	-17 dBFS (+4 dBu)

Line input building blocks

Extron building blocks for line level devices set the gain level for the specific device and its operating line level. Bass and treble shelving filters are inserted into the filter block, with gain level set to 0 dB. This allows for tone adjustment, if necessary, either via the DSP Configurator software or by programming the gain parameters into a control system and allowing the user to make adjustments. Light compression is added to the channel to normalize diverse signal levels, with threshold set at -17 dBFS and a 2:1 compression ratio. The compressor threshold is at target level so as not to greatly affect unity gain (at the target level) through the system.

The table below shows different line level device categories, and their operating line level. Gain compensation is based on the operating level and the gain required to bring the signal up to the target level. When the target level is achieved at the input, maintaining unity gain through the system will produce + 4 dBu at the output. Gain compensation for line levels in dBV is calculated by first converting the source output level to dBu.

Source Type	Operating Level	Gain Compensation	Target Level
Consumer Player	-10 dBV	+11.8 dB	-17 dBFS (+4 dBu)
Computer Sound Card	0 dBV	+1.8 dB	-17 dBFS (+4 dBu)
Pro Level (balanced)	+ 4 dBu	0 dB	-17 dBFS (+4 dBu)
Broadcast Level	+ 8 dBu	-4 dB	-17 dBFS (+4 dBu)

Line output building blocks

The output channel building block inserts an equalization curve into the output signal chain of the DSP. A compressor is inserted on the output, set to a nominal level for speaker protection. The output level is given a nominal setting from which you can make final adjustments to suit the room.

Background

The equalization curves used for the output building blocks were generated by measuring the sound power response of an array of nine (9) identical speakers mounted in a large acoustically dead room. For testing, 400 samples were taken throughout the sound field of the speaker array and averaged together, which provided the average sound power response of the nine (9) ceiling speakers. This was repeated with the speaker array at 6 feet, 8 feet, and 12 feet spacings between speakers. The results were merged into a single response curve for all three configurations, comprised of over 1200 samples (total average).

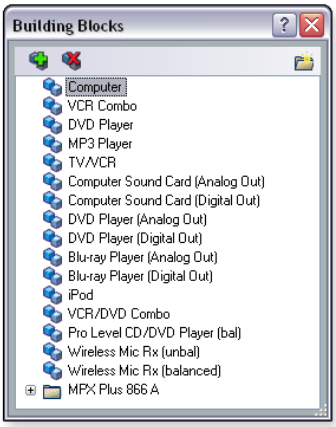
NOTE: An array of four (4) Extron FF 120T and FF 220T speakers were used at 12 feet, 16 feet, and 20 feet spacings, since the Flat Field Technology® provides more consistent sound levels across the listening area than conventional coverage patterns.

This total average curve was then inverted and loaded into a real time analyzer (RTA). Calibrated pink noise was introduced into the Extron DSP and the output of the DSP presented to the RTA. The RTA was put into A - B subtraction mode, with the total average curve being subtracted from the real time pink noise. The resulting response on the RTA was an electrical facsimile of the average acoustic response of the speakers. Parametric filters were then employed on the DSP to flatten the response curve on the RTA. Those filters were then saved into the building block for that speaker type.

The purpose of the speaker building blocks is to normalize the inherently non-linear response of a ceiling speaker array, as opposed to flattening the on-axis response of a single speaker. Depending upon the source, additional sweetening of the signal may be desired. For microphones, a high pass filter should be employed to eliminate popping and in certain cases, tone shaping of the speech range may be desired. For music sources, a bass boost is often employed to sweeten the sound at lower levels. Since the "sweetening" for microphones and music sources are, for all intents and purposes, somewhat opposite, adding this to the outputs would render an output ideal for one or the other, but not both. As such, Extron has included the "sweetening" curves into the input building blocks, allowing voice lift and music to coexist in the same speaker system while maintaining attributes needed for both.

Inserting a building block

When you select a channel, only building blocks compatible with the selected signal path are displayed in the building blocks list.



To insert a building block for an input:

1. Click the input channel number located beside the channel name. The Building Blocks dialog box opens, listing all possible input templates (such as for a mic or line input).

   NOTE: The Building Blocks dialog box may differ from the image shown at right depending on the signal path.

2. Click the desired input channel building block in the list. The Building Blocks dialog box closes and the input channel building block loads all pre-configured processor blocks, sets the gain, and gives a name to the channel.

To insert a building block for an output:

1. Click the output channel number located beside the channel name. The Building Blocks dialog box opens, listing all possible output templates (such as a speaker type).
2. Click the desired output channel building block in the list. The Building Blocks dialog box closes and the output channel building block loads all pre-configured processor blocks and gives a name to the channel.

After inserting a building block, you can modify the processor blocks if desired.

Modifying and adding a building block

Building blocks can be modified and saved to give you a customized set of tools that are unique to your needs. Any mix-points that are associated with a signal path are not saved and recalled with the associated signal chain building block.

You can create a building block from an existing configuration to be used in the future (such as for another input or in another configuration file).

To create a building block:

1. Configure the processor blocks as needed for the signal chain (see the topics in the **Workspaces** section).
2. Click the channel number. The Building Blocks dialog box opens.
3. Click the icon. The Add a Building Block dialog box opens.
4. In the **Name** field, enter a name that identifies the building block.
5. From the **Create In** drop-down list, select the folder in which to place the building block. The default selection is **Building Blocks**, which places the new building block on the root level of the building blocks list, not in a folder. Click **New Folder** to create a new folder for the building block.
6. Click **Add**. The Add a Building Block dialog box and Building Blocks dialog box close, returning you to the workspace.

You can modify a pre-configured building block and save these changes, creating another building block.

To modify a pre-configured building block:

1. Insert a building block for an input or output (see the "**Inserting a Building Block**" section above).
2. Follow steps **1** through **6** above.

Deleting a building block

You can delete a building block from the list in the Building Blocks dialog box. If you delete a default building block, you can restore it if needed. See the "Restoring Default Building Blocks" subsection of "Organize Building Blocks" in the *DSP Configurator Help* file for details and method.

To delete a building block:

1. Click the channel number located beside the channel name. The Building Blocks dialog box opens.
2. To delete a folder and the associated building blocks, select the folder from the list and click the icon.

   - or -

   To delete an individual building block, right-click the listed building block and select **Delete** from the drop-down menu.

Group Masters — An Overview

There are 32 group masters that can each be configured to control up to 16 group members. For the MLS 608 D Series, there are five pre-configured group masters.

- **Program Volume** — Groups gain controls at the post-switcher gain point. Default membership includes channels 1, 3, and 4 (MA and SA models). The default gain value is -10 dB.
- **Mic Volume** — A gain control at the pre-mixer gain points in the mic/line signal chain. Default membership is channels 1 and 2. The default gain value is 0 dB.
- **Output Bass** — A bass tone (shelving filter) boost/cut control in the line output signal path. Default membership includes all output channels. The default gain value is 0 dB.
- **Output Treble** — A treble tone (shelving filter) boost/cut control in the line output signal path. Default membership includes all output channels. The default gain value is 0 dB.
- **Output Volume** — A mute control that globally mutes all output volume gain points. The default mute status is unmuted.

The MLS 608 D Series front panel Program Volume knob controls the Program Volume group, and the front panel Mic Volume knob controls the Mic Volume group. While these groups cannot be deleted, group membership can be modified (see the Configuring Groups subsection below).

Group masters are configured in DSP Configurator and saved in the device. Working in Emulate mode, group masters can be saved in a configuration file and pushed to the device upon connection.

A group master can be either a gain control or a mute control. Group masters can be configured for bass and treble gain controls, provided that bass and treble filters have been inserted in a signal chain. You can select a single control type (for group members) that is to be controlled by a group master. For example, a group master can be configured to control post-switcher gain levels, but not post-switcher gain levels plus another type of gain block.

A group member can be controlled by multiple group masters. It is recommended that this feature be used with caution, as "overlapping" membership can quickly become unmanageable (see the "**Multiple Group Masters**" section).

Group master gain controls can send specific values such as those sent by a fader control. You can also set group master gain using increment and decrement controls (see the "**Tools**" section). .

Configuring Groups

For an MLS 608 D Series device, five group masters are pre-configured and relate to program volume, mic volume, output bass, output treble, and volume mute. These groups cannot be deleted; however, group membership can be modified.

To modify a pre-configured group:

1. From the **Tools** menu, select **Configure Groups**. The Configure Groups dialog box opens.

   - or -

   From the **View** menu, select **Group Controls** and click **Add a Group** in the Group Controls dialog box. The Configure Groups dialog box opens.

   - or -

   From the **View** menu, select **Group Controls** to open the Group Controls dialog box. Then, double-click one of the displayed group controls to open the Configure Group dialog box. The Configure Group dialog box opens to the selected group master, expanding the associated control type tree to show the group members.

2. From the **Select Group** drop-down list, select one of the pre-configured groups. The tree in the Select Control Type section expands based on the selected group. In the Available Group Members section, the group members with a selected check box are associated with the selected group master. Available members that are controlled by an existing group master are indicated with blue text.
3. Modify the group membership as desired by selecting or clearing the group member check boxes.
4. Click **Apply**.

To add and configure a group:

1. From the **Tools** menu, select **Configure Groups**. Alternatively, from the **View** menu, select **Group Controls** and click **Add a Group** in the Group Controls dialog box. The Configure Groups dialog box opens.
2. The **Select Group** drop-down list defaults to the first empty group. Select an empty group if necessary, or select an existing group to overwrite.
3. In the Select Control Type section, expand the tree for the type of control (gain or mute) you want to group. To expand the tree, click the ⊞ sign beside the control type.
4. Select the desired gain or mute control type (such as **Input Gain** beneath the gain control). The Available Group Members section populates with all possible members for the selected control type. Available members that are controlled by an existing group master are indicated with a blue font.

   In the Available Group Members section, select the desired group members by selecting the associated check boxes. When a ⊞ sign exists, click the associated check box to select the entire tree. Alternatively, you can select individual members within the tree. To do so, click the ⊞ sign to expand the tree and select the check boxes for individual members.

5. Click **Apply**. To configure additional groups, repeat steps 2 through 5

To delete a group:

1. In the Configure Groups dialog box, select a group from the **Select Group** drop-down list and click **Delete Current Group**. The Confirm Deletion dialog box opens.

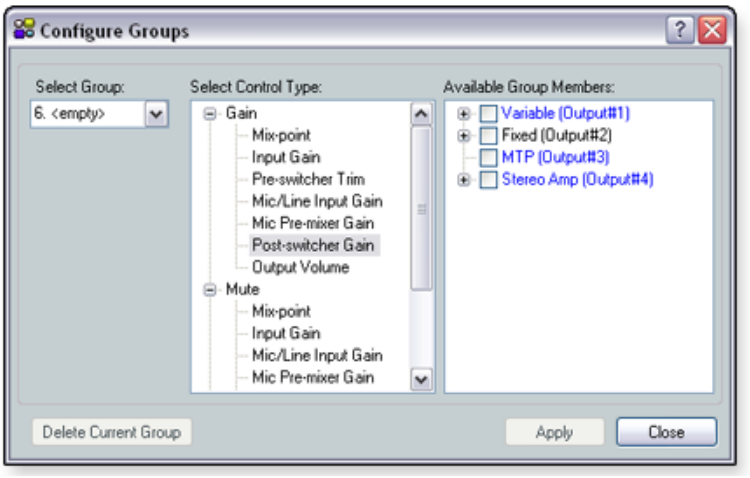


Figure 17. Configure Groups Dialog Box

2. Click **Yes** to delete the group.

Viewing Group Controls

From the **View** menu, select **Group Controls** to open the Group Controls dialog box. You can resize this window as needed.

The Group Controls dialog box contains two items in the menu bar:

- Add a Group
- Tools

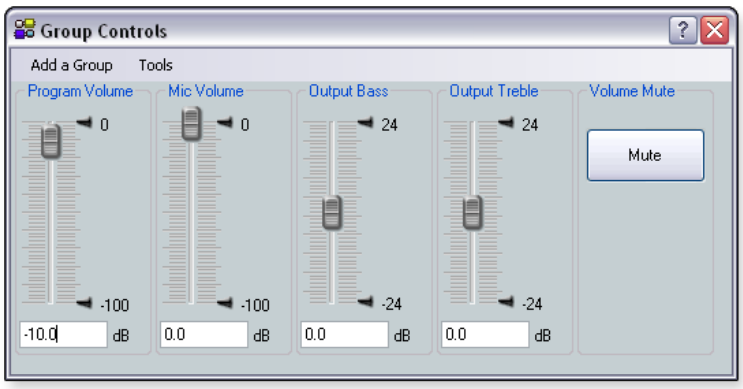


Figure 18. Groups Controls Box

Add a Group

Clicking the **Add a Group** option in the Group Controls dialog box opens the Configure Groups dialog box.

After you add a new group and click **Apply** in the Configure Groups dialog box, the Group Controls window refreshes to display the added control.

See the "**Configuring Groups**" section above for the procedure to add and configure groups.

Tools

The **Tools** menu in the Group Controls dialog box contains four options:

- **Clear All Groups** — Clicking this option clears all group members and group master parameters.
- **Increment/Decrement Simulator** — Clicking this option allows you to test the increment and decrement values (see below for more information).
- **Refresh All Group Data** — Clicking this option refreshes the group control data.
- **Group Details Report** — Clicking this option generates a report that lists all group masters and group membership.

The Increment/Decrement Simulator allows you to set the increment and decrement values, providing control of increment and decrement adjustment. This control is temporary because the increment or decrement value is not stored in the device. The default value is 1.

To use the Increment/Decrement Simulator:

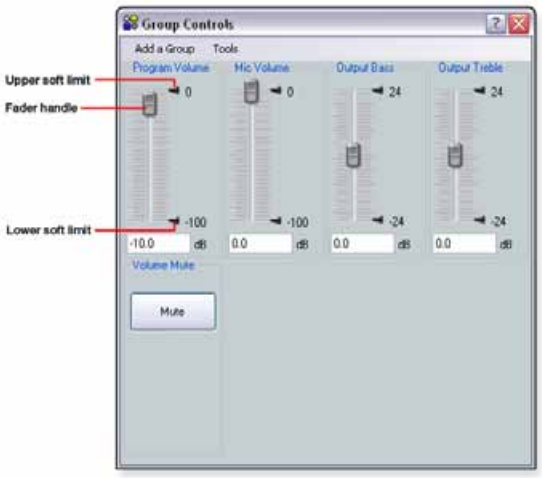
1. From the **View** menu, select **Group Controls**. The Group Controls dialog box opens.
2. From the **Tools** menu, select **Increment/Decrement Simulator**. The Inc/Dec Simulator dialog box opens. The controls and settings in the dialog box are unavailable until you select a group.
3. From the **Select Group** drop-down list, select the group for which to test the increment and decrement values.
4. Enter an increment value and a decrement value into the associated **Increment Value** field and **Decrement Value** field, as needed. The default value is 1. For gain controls, you can enter a value up to 0.1 dB resolution.
5. Click the **Increment** button and **Decrement** button as needed. The group master control increases or decreases, respectively, by the set value to the top or bottom of its soft limit range

Soft Limits

Each gain control type provides upper and lower soft limits that can be used to limit the range of the group master control. When you create a group master, these soft limits default to the inherent "hard" limits of that particular control (the upper and lower limits defined by that control).

Soft limits can be defined using the following methods.

- Click and drag the soft limit handle (see image at right).
  The soft limit resolution is 0.1 dB.
- Click within the relevant Group Master fader areas (program volume, mic volume, output bass, output treble) to bring focus to the fader, then use the following key combinations.



To adjust the upper limit, press and hold the <Shift> key.

- Hold <Shift> and press <Up arrow> or <Down arrow> to adjust the upper limit in 0.1 dB increments.
- Hold <Shift> and press <Page Up> or <Page Down> to adjust the upper limit in 10 dB increments.
- Hold <Shift> and press <Home> to adjust the limit to the upper default.
- Hold <Shift> and press <End> to move the limit to the fader position.

To adjust the lower limit, press and hold the <Ctrl> key.

- Hold <Ctrl> and press <Up arrow> or <Down arrow> to adjust the lower limit in 0.1 dB increments.
- Hold <Ctrl> and press <Page Up> or <Page Down> to adjust the lower limit in 10 dB increments.
- Hold <Ctrl> and press <Home> to adjust the limit to the fader position.
- Hold <Ctrl> and press <End> to move the limit to the lower default.

Group Members

After a group has been created, the group members (the individual controls that comprise the group) update to indicate that they are now part of a group. You can individually control group members. This allows for relative levels between group members to be fine-tuned. Group member levels can also be set by a preset recall.

DSP Configurator displays the group member value plus the offset created by the group master. As a result, the application always displays the value that you are hearing. However, the value of the group member that is on the device is always the actual value, independent of the added group master offset value. If a group master is deleted, the group member value reverts to its actual value.

For example, when the group master is set to -10.0 dB and the group member value is 0.0 dB, the group member displays the value of the group member plus the group master offset, which is -10.0 dB. The MTP output post-switcher gain reflects the -10.0 dB group master offset plus the -6.0 dB mono sum offset. The value shown below the fader is -16.0 dB, yet the actual value of the MTP output post-switcher gain is -6.0 dB.

Multiple Group Masters

A group member can be controlled by multiple group masters. It is recommended that this feature be used with caution, as "overlapping" membership can quickly become unmanageable.

Multiple group masters can be useful in instances such as when Group 1 controls the volume in Room A, Group 2 controls the volume in Room B, and Group 3 controls volume in a combined Room A and B.

NOTE: When using multiple group masters, the offset value that is added to the group member value is the sum of all group masters acting on the group members.

When configuring a group, the group members that are already being controlled by another group master are indicated with blue text in the Available Group Members section of the Configure Groups dialog box. After creating the group, the control dialog boxes for each group member change from displaying membership in a single group to displaying membership in multiple groups.

Optimizing Video — An Overview

After the input and output connections have been completed, both the MLS 608 D and the MTP/HDMI U R need to be configured to optimize the video.

Setting the Peaking and Level on the MTP/HDMI U R

Image sharpness is adjusted with the Peaking control. This applies only to the analog side of the device. Increased peaking compensates for mid- and high-frequency detail loss. Minimum setting (full counterclockwise) is zero peaking.

Image brightness is adjusted using the Level control.

NOTE: To avoid possible video loss due to errors in the video format detection, the user should always start with minimal level and peaking, then only increase values as required.

To adjust level and peaking between the MLS 608 D and the MTP/HDMI U R receiver:

1. Connect an oscilloscope (preferred) or a monitor (acceptable) to the RGB output of the MTP/HDMI U R receiver.
2. If using an oscilloscope, apply a white field test pattern to inputs 1, 2, or 3 on the MLS 608 D. The Extron VTG 300 or VTG 400 is recommended to provide the test pattern.
3. If using a monitor, apply a grayscale or color bars test pattern to the input.

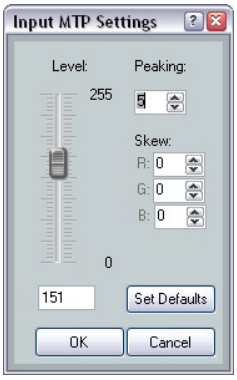
   NOTE: The signal applied should be an RGB signal.

4. Observe the oscilloscope (or monitor) with a critical eye while you adjust the front panel input level and peaking controls to compensate for signal loss between the MLS 608 D and the MTP/HDMI U R.

If using Input 4 on the MLS 608 — setting level and peaking via software

Follow the steps 1 to 3 as given in "To adjust level and peaking...." above:

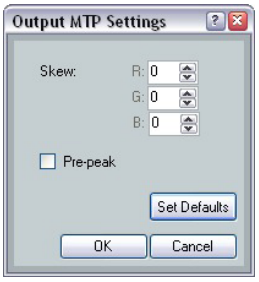
1. Start the DSP Configurator software program and connect to your device. See the **DSP Configurator** section for software installation details.
2. Click **`View>Video I/O`** (or press <F4>); this changes the window to the MLS workspace view. Double click on the MTP on the Input 4 (left) side of the workspace view. The Input MTP Settings dialog box appears (see image at right).
3. Observe the oscilloscope (or monitor) with a critical eye and adjust the level using the slider. Adjust the peaking by using the up and down arrows. Disconnect test equipment when finished.



Setting the Skew on the MLS 608 D

To adjust output skew between the MLS 608 D and the receiver:

1. Connect an oscilloscope (preferred) or a monitor (acceptable) to the RGB output on the MTP/HDMI U R.
2. Apply a crosshatch test pattern to the inputs 1, 2, or 3 on the MLS 608 D.
3. Use the test equipment or examine the video image with a critical eye to determine which video signal (red, green, or blue) is most shifted to the left.
4. Within the DSP Configurator program, click **`View>Video I/O`** (or press <F4>) to access the MLS workspace view. Double-click MTP on the output (right) side of the workspace view. The Output MTP Settings dialog box appears (see image at right).



5. While observing the oscilloscope or monitor, adjust the furthest left video signal by using the up and down arrows for the relevant signal color, and repeat as needed until all three colors are aligned correctly.

If using Input 4 — input skew adjustment

Follow the steps 1 to 3 as given in "Output skew", above. Then:

1. Within the DSP Configurator program, click **`View>Video I/O`** (or press <F4>) to access the MLS workspace view. Double-click MTP on the output (right) side of the workspace view. The Input MTP Settings dialog box appears.
2. Adjust the furthest left video signal by using the up and down arrows for the relevant signal color, and repeat as needed until all three colors are aligned correctly.

Selecting the MLS 608 D Output PrePeak

1. Click **`View>Video I/O`** (or press <F4>); this changes the window to the MLS workspace view. Double click on the MTP on the output (right) side of the workspace view. The Output MTP Settings dialog box appears.
2. Toggle the **`Pre-peak`** box on or off as desired.

NOTE: For other video configurations, such as RGB delay, or input video format swapping, see the *DSP Configurator Help* file.

Firmware Upgrades

Within the DSP Configurator software, the Firmware Loader option (click **Tools > Firmware Loader**) opens the Extron Firmware Loader application, allowing the user to to load new firmware to their device, through either serial or USB connection.

In order for the Firmware Loader option to work, you must have the Firmware Loader application installed.

To download Firmware Loader from the Extron website:

1. Open an Internet browser window and in the **Address** field, enter ***www.extron.com***.
2. In the **Search** field, enter ***Firmware Loader***.
3. Press <Enter> on your keyboard.
4. Locate the Firmware Loader application in the search results and click **Download Now!**
5. Complete the personal information form, if necessary.
6. Click **Download** ***fw_loader_vxxxxx.exe*** to begin the download.

Follow the on-screen prompts to complete the download.

See the *Firmware Loader Help File* and supporting documentation for further information about using Firmware Loader.

Updating Firmware

NOTES:
- Before updating the firmware through DSP Configurator, the Firmware Loader application must be installed on your PC. **See "To download Firmware Loader from the Extron website"** section.
- You can download current firmware updates from the Firmware Download Center page of the Extron website. This file downloads onto your PC.

1. Within DSP Configurator open the **Tools** menu and select **Firmware Loader**.
2. From the **File** menu of Firmware Loader, select **New Firmware for Selected Devices**.

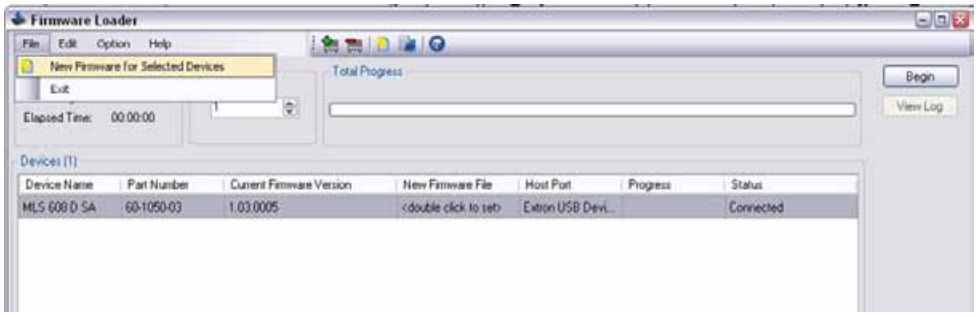


Figure 19. Firmware Loader — New Firmware for Selected Devices

- or -

In the **Devices** section of the Firmware Loader main screen, double-click the **New Firmware File** field associated with the selected device. The Choose Firmware File dialog box opens.

3. Browse to and select the device-specific firmware file that has been downloaded on your PC. Valid firmware files have an S19 file extension.

4. Click **Open**. This closes the Choose Firmware File dialog box and returns you to the Firmware Loader main screen.

5. Click **Begin**. This uploads the new firmware onto your connected device. The Progress bar for the selected device shows the progress of the upload. After the upload is complete, this field is blue and shows 100%.

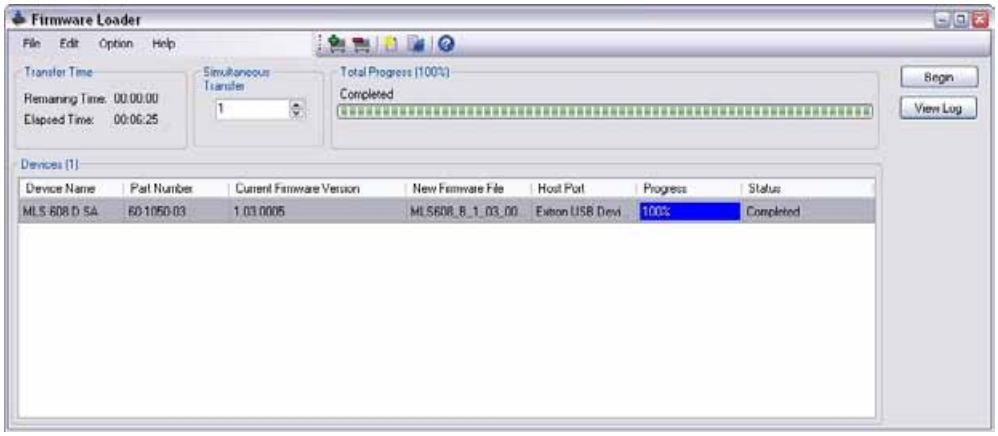


Figure 20. Firmware Loader — Loading Complete

6. Exit Firmware Loader. The DSP Configurator workspace restores itself and returns you to Emulate mode because connection is lost after a firmware upload.

To reconnect to the device click the **Live** button in the application window or from the **Tools** menu, select **Connect to Device**.

DSP Configurator™

As the MLS 608 D Series of switchers are ProDSP™-capable products, the Extron Digital SIgnal Processor (DSP) Configurator application can be used as a configuration tool via RS-232 or front panel USB connection.

The DSP Configurator provides access to audio level and DSP processing controls that are essential for setting up and configuring audio systems. DSP Configurator can be used to configure the device video functions, and manage the audio processor settings including audio gain, dynamics, filtering, delay, ducking, and feedback suppression.

Depending on the device connected, there are several workspaces available from which processing blocks, mix-points, and audio and video ties can be created, changed, and viewed. These workspaces allow a quick view of the DSP signal chain setup so that the audio system can be fine tuned as needed.

This section describes DSP Configurator installation and startup, basic menu details, and how to access the *DSP Configurator Help* file. Topics that are covered include:

- **Installing the Software**
- **Starting the DSP Configurator**
- **Using the DSP Configurator Software**

The software is compatible with Windows 98, Windows NT, Windows 2000, Windows XP, Windows Vista and Windows 7. The DSP Configurator program is included on the Extron DVD. Updates can be downloaded from the Extron website (**http://www.extron.com**).

NOTE: The program requires a minimum of 32 MB of hard disk space.

Installing the Software

The DSP Configurator software can be installed onto the hard drive of a connected PC either directly from the supplied DVD or downloaded from the Extron website.

Installation From the DVD

1. Insert the DVD into the applicable drive. The DVD runs automatically.

NOTE: The DVD automatically starts only if you have a DVD drive on your PC.

The Extron software window appears.

2. If the disc does not start automatically, run LAUNCH.EXE from the disc.
3. Follow the instructions that appear on the screen.

By default, the installation creates a **C:\Program Files\Extron\DSP_Configurator** directory and places a shortcut icon in it.

NOTE: During initial installation, the user is asked if they wish to install the USB drivers or not. You should accept the installation, as these drivers are essential for connecting to a PC or control device via the front panel mini USB port of the MLS 608 D unit.

Installation from the Website

1. On the Extron website (**www.extron.com**), select the **Download** tab.
2. On the Download Center screen, select **Software** from the left side-bar menu.
3. Locate the DSP Configurator program file from the list and click on it.
4. Follow the on-screen instructions to download the program to your PC.

Starting the DSP Configurator

Click **Start > Programs > Extron Electronics > DSP_Configurator > DSP Configurator.exe.** Alternatively, if an icon was installed on the desktop, double-click the icon to start the DSP Configurator program.

The device selection window appears.

5. Select the appropriate device from the drop-down list and click **OK**.

NOTE: To exit without starting the program, click **Cancel**.

DSP Configurator opens to the default Audio & Video I/O workspace, in Emulate mode (**see figure on next page**). This workspace is a blank configuration for the selected device.

NOTE: The green box in the top right corner of the workspace identifies the current mode, "Emulate" or "Live."

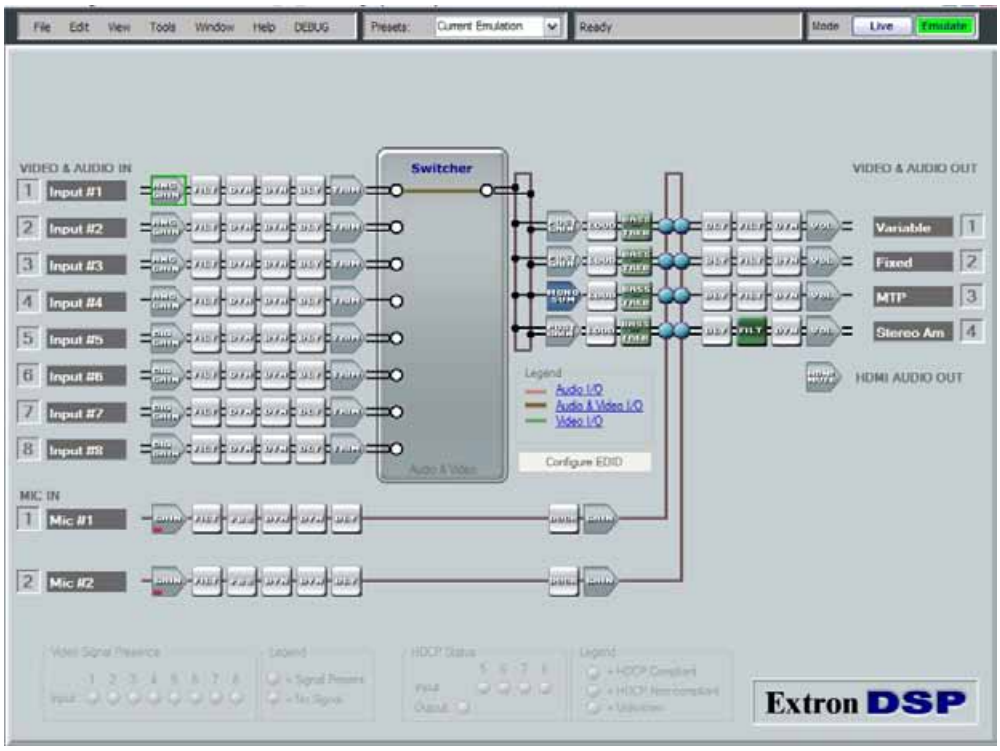


Figure 32. The Default Audio and Video I/O Workspace in Emulate Mode

For the MLS 608 D, the DSP Configurator has four workspaces:

- Audio and Video I/O workspace
- Audio I/O workspace
- Video I/O workspace
- Console View workspace

Each workspace provides a map of all input and output signal paths inside the main application window. Within these workspaces you can configure various settings related to audio and video such as audio gain, trim, volume controls, and video format, as well as setting video ties in follow or breakaway mode.

NOTE: When the program is running, access the Help file (**`Help > Contents`** or press <F1>) to see the detailed procedures for using DSP Configurator.

DSP Configurator can be used in either of two operational modes: Live and Emulate. From the blank Emulate mode configuration it is possible to build a configuration and a set of presets. Alternatively you can open an existing file that contains the last configuration displayed and any saved presets.

In Emulate mode, the video signal presence and HDCP status indicators (at lower left of workspace window) are grayed out. When in Live mode these are fully functional (**see figure 34**). In addition when DSP Configurator is in Live mode, two communication indicators (Transmit and Receive) appear at the lower right corner of the workspace.

Using the DSP Configurator Software

The typical normal method of using DSP Configurator is to:

1. Create a configuration and a set of presets in Emulate mode.
2. Save the file.
3. Push (upload) the file to the device.

Emulate mode allows you to work within the program offline, creating or editing configurations. In Emulate mode the current configuration is titled Current Emulation, while in Live mode the current configuration is titled Current State.

In Live mode, DSP Configurator establishes a connection and is synced to the device. Live mode can be entered at any time after launching the application by using either a "push" or "pull" synchronization. In Live mode, changes made within DSP Configurator affect the device and changes to the current state of the device (from another control source) are reflected in DSP Configurator. Presets can be built and saved from the current state and stored to the device.

Orientation

Each of the four DSP Configurator workspace windows, in both Emulate or Live mode, has six menus on the menu bar:
`File, Edit, View, Tools, Window,` and **`Help`**.
Click on each as desired.

Figure 33. Workspace Window Menu Bar

Also on the menu bar are three other sections. Left to right these are:

- **Presets** — This shows a list of currently saved presets and current configuration. The Ready section shows Preset controls

- **Ready** — Ready (status and file transfer progress indicator). This shows "Ready" when the Current State is selected and all actions have been completed, and shows the Preset controls (Recall, Cancel, and Delete), when a saved preset configuration is selected.
- **Mode** — This indicates the current device mode, either Live or Emulate.

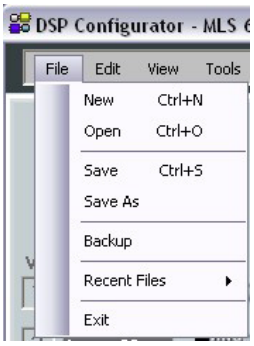
NOTE: For detailed DSP Configurator instructions when the program is open, press <F1> or click on **`Help > Contents`**.

At the very top of the workspace window, the DSP Configurator application name is shown, plus the selected device name, the configuration file name, and the current mode the application is running in (Live or Emulate). At the top right are the standard Windows minimize, maximize, and close window icons. Use these as desired.

Workspace Menus

NOTE: For detailed DSP Configurator instructions when the program is open, press <F1> or click on **Help > Contents**.

File menu



Click on this to open a drop-down menu displaying seven selectable options: **New, Open, Save, Save As, Backup, Recent Files,** and **Exit**.

- **New** — Select this to create a new configuration.

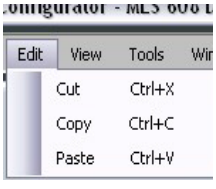
  NOTE: When in Live mode, the **New** option is disabled.

- **Open** — Select this to open an existing configuration (an .EDC file). A secondary window opens allowing the user to browse to the folder where existing configuration files are stored. Select a configuration file as desired.
- **Save** — Select this to save the current DSP configuration to the PC. A secondary window opens allowing the choice of a folder location for the saved EDC files.
- **Save As** — Select this to save a file to a new name to the PC. A secondary window opens allowing a choice of which folder to save the files to. If saving over an existing file, a popup confirmation window opens allowing the action to be completed or cancelled.
- **Backup** — Select this to backup data from the device to a PC. Do this when the device data becomes out of sync with the stored data in an existing file. This may happen when original emulation files becomes changed in Live mode with, for example, the addition of presets. Follow on-screen instructions to complete.

  CAUTION: Do not perform this operation during a live event, because all presets are called sequentially during this procedure.

- **Recent Files** — Select this to view a list of up to five of the most recently opened configuration files. Click on the listed file name to re-open the file.
- **Exit** — Select this to exit the control program. This disconnects and closes DSP Configurator.

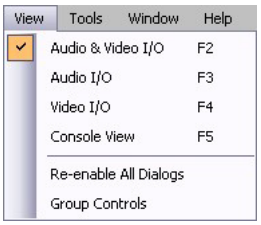
Edit menu



Click on this to open a drop-down menu displaying three selectable options for the keyboard methods to **Cut, Copy,** and **Paste.**

- **Cut** — Select this to remove one or multiple elements from a specific place within a workspace. The element can then be pasted to an existing element of a similar type within the same workspace. At that point in time the original element is remove and replaced with a default element.
- **Copy** — Select this to copy one or multiple elements within a workspace. The copied elements can be pasted to existing elements of a similar type within the same workspace. A confirmation dialog opens before pasting is completed.
- **Paste** — Select this to paste a cut or copied elements over an existing element.

View menu



Click on this to open a drop-down box displaying six selectable options, including four workspaces: **`Audio & Video I/O, Audio I/O, Video I/O,`** and **`Console View,`** and **`Re-enable All Dialogs`** and **`Group Controls`** menus.

Workspace menus

NOTE: Detailed instructions for configuring and using the workspaces on the MLS 608 D series can be found in the *DSP Configurator Help File*, "Detailed Procedures and Reference Material" book, "Optimizing Audio Levels" section and the "Workspaces" book within the MLS 608 D Series section.

- **Audio & Video I/O** — The Audio and Video I/O workspace is used for viewing and configuring video ties in follow mode. This is the default workspace that the application opens when initially launched. This workspace contains the video matrix and the audio matrix with the DSP signal chain. All audio gain, trim, volume controls, and audio DSP signal processors can be accessed within this workspace. <F2> is the shortcut key.

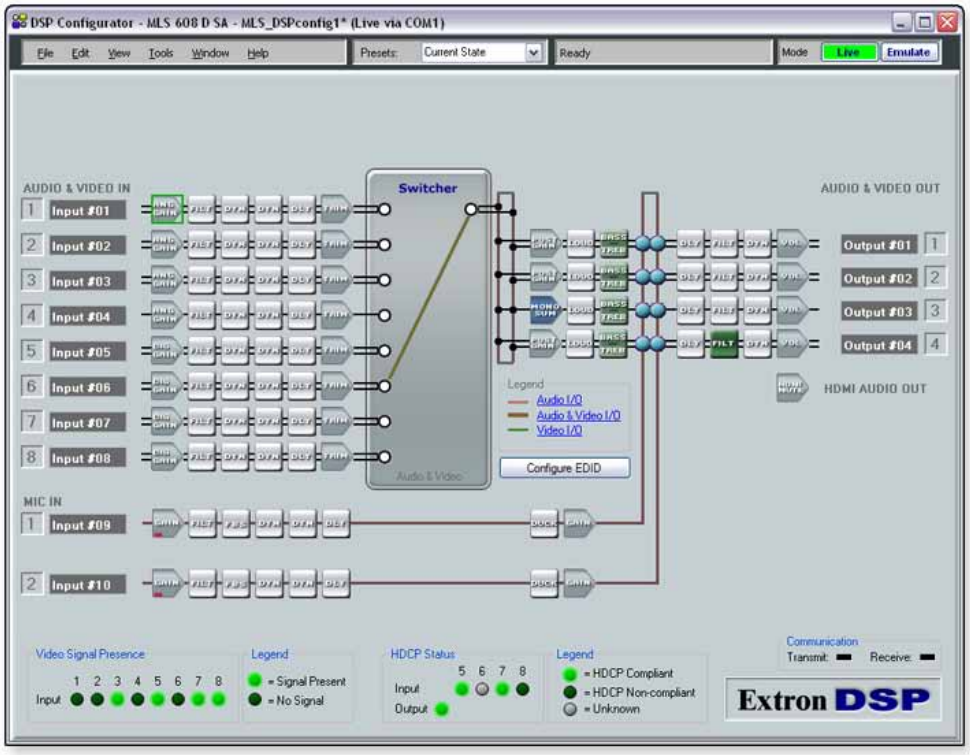


Figure 34. The Audio and Video I/O Workspace in Live Mode

- **Audio I/O** — The Audio I/O workspace is used for viewing and configuring audio ties in breakaway mode. This workspace contains all audio, gain, trim, volume, and audio DSP processor settings. <F3> is the shortcut key.

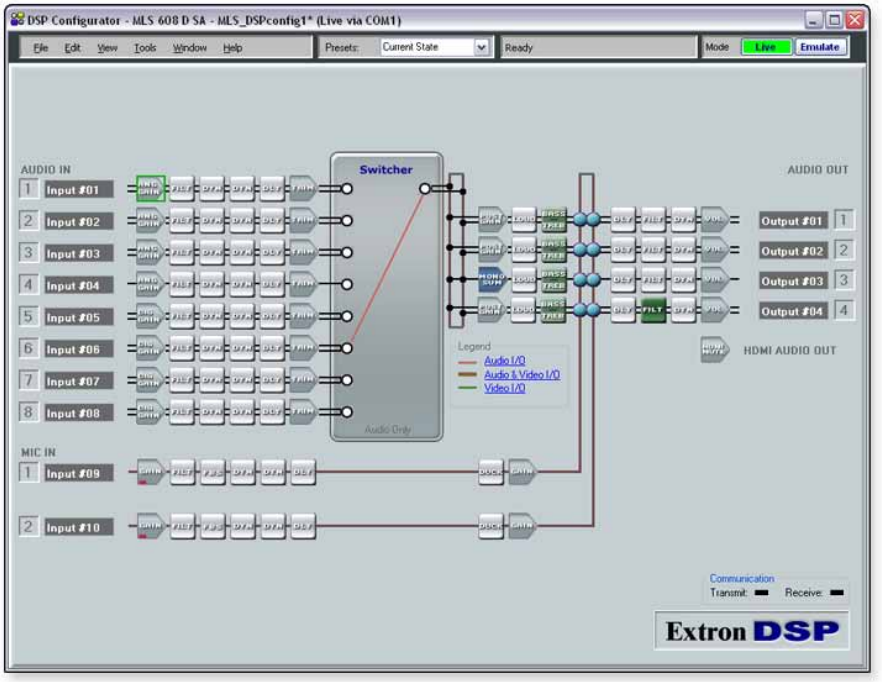


Figure 35. The Audio I/O Workspace in Live Mode

- **Video I/O** — The Video I/O workspace is used for viewing and configuring video ties in breakaway mode. This workspace contains the low-resolution video input, RGB delay, and video mute settings. <F4> is the shortcut key.

  For Input 4 (MTP) and the MTP output configuring, **see "MTP Video Settings"** later in this chapter.

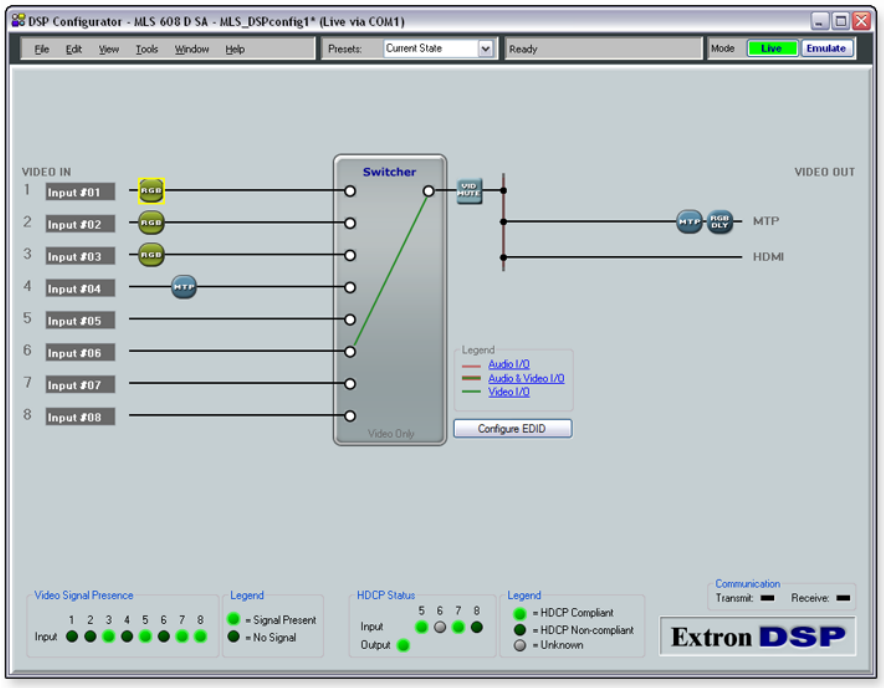


Figure 36. The Video I/O Workspace in Live Mode

- **Console View** — This is used to provide access to all gain points plus a meter bridge in a single view. This is useful for fine tuning gain structure during system testing and commissioning. <F5> is the shortcut key.

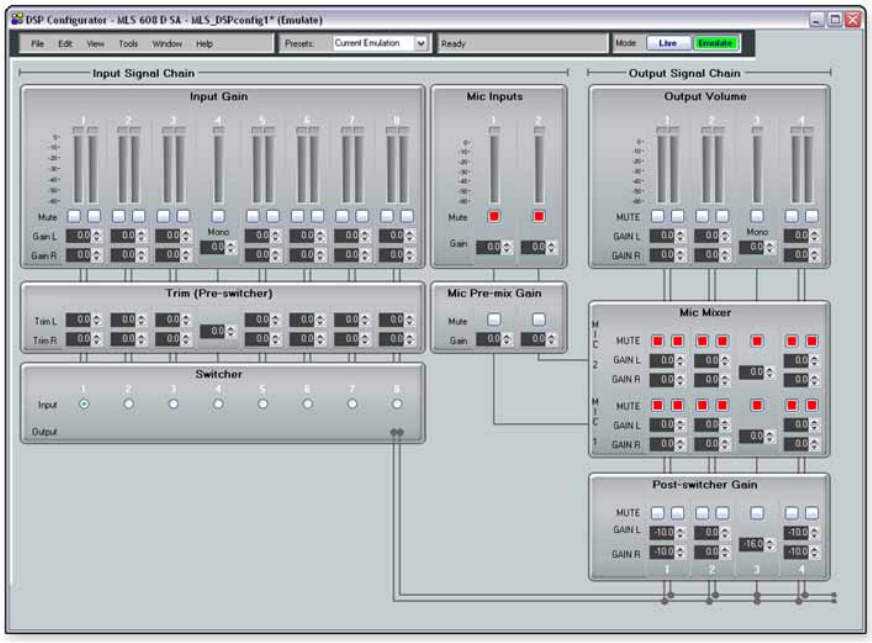


Figure 37. The Console View in Emulate Mode

Other View menus

- **Re-enable All Dialogs** — Selecting this option re-enables all dialogs that were disabled and currently no longer appear (based on user selection), such as the notification dialog when a preset was saved.
- **Group Controls** — Selecting this option opens the Group Controls dialog from which a new group can be added and the increment/decrement simulator can be accessed. The group control (such as a gain control or mute control) and the associated soft limits can also be adjusted.

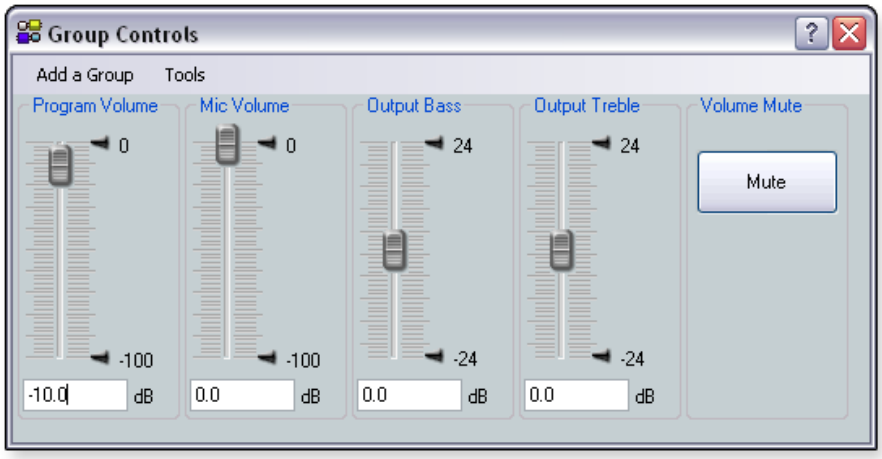
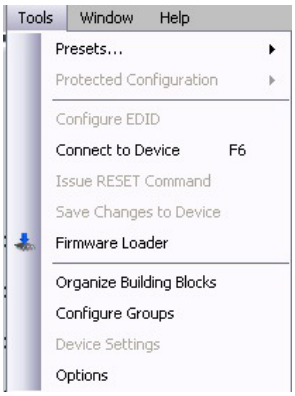


Figure 38. Group Controls, Showing the Five Pre-configured Groups

For details of the two submenus (**`Add a Group`** and **`Tools`**) associated with this option, see the the "Operations" section in this manual or the *DSP Configurator Help* file, "Workspaces", "Gain Controls", "Group Masters," "Viewing Group Controls".

Tools menu



Click on this menu to open a drop-down list: **Presets, Protected Configuration, Configure EDID, Connect to Device, Issue RESET Command, Save Changes to Device, Firmware Loader, Organize Building Blocks, Configure Groups, Device Settings,** and **Options**.

NOTE: **Connect to Device** menu changes to **Disconnect from Device** when a device is connected.

- **Presets** — Selecting this option brings up four submenus: **Mark All Ties, Mark All Items, Save Presets,** and **Clear Marked Items**.

  Up to 8 presets can be saved in either Live or Emulate mode, and then uploaded to a connected device or after recall, downloaded for saving to disk. **All Ties** and **All Items** be selected for saving as a full preset, and are visibly highlighted green on the screen. Any marked items can also be cleared, removing them from the current preset to save option.

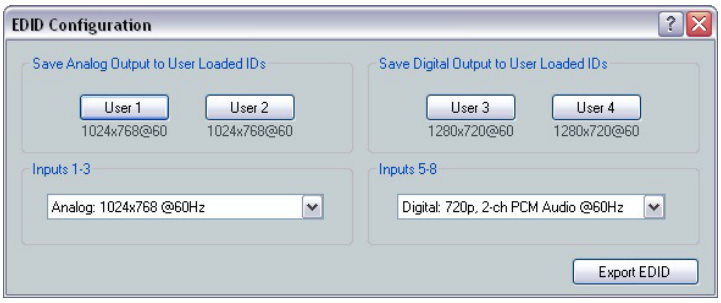
  NOTE: Presets that are saved via DSP Configurator are partial presets, which can include any or all the gain, processor, switcher, and mic-mixer settings.

  For full details on how to save, preview, and recall presets see the *DSP Configurator Help File*.

- **Protected Configuration** — Selecting this option when in Live mode brings up three submenus: **Save, Restore,** and **Change PIN**. A protected configuration is a password (PIN)-protected configuration containing all elements (includes all level settings, DSP processing, ties, and video controls). These submenus allow the user to save the current configuration as a protected configuration, restore a previously saved protected configuration (this overwrites all current audio and video settings), and change the 4-digit PIN. The submenus are only available in Live mode.

Figure 39. The Protected Configuration Submenu within the Tools Menu

- **Configure EDID** — Selecting this option opens a window that allows adjustments to be made to the EDID settings for analog inputs 1 through 3 and digital inputs 5 through 8. The EDID information provided at the analog or digital output can be stored to a selectable location. Any changes are made directly on the inputs. The EDID configuration option is available only in Live mode.



- **Connect to (or Disconnect from) Device** — Selecting this option allows the user to connect to or, if already connected in Live mode, disconnect, from the MLS 608 D unit. The menu name is displayed as appropriate to the current connection status. <F6> is the shortcut key.

  When selecting to connect to a device, a window appears with two connection method tabs (RS-232 or USB). Select a tab and complete the fields on the tab as appropriate.

  After initial connection a Synchronize with Device dailog box appears. Select **Pull** (download, default setting) or **Push** (upload) as appropriate. The **Push** selection also has a configurable Advanced option dialog box.

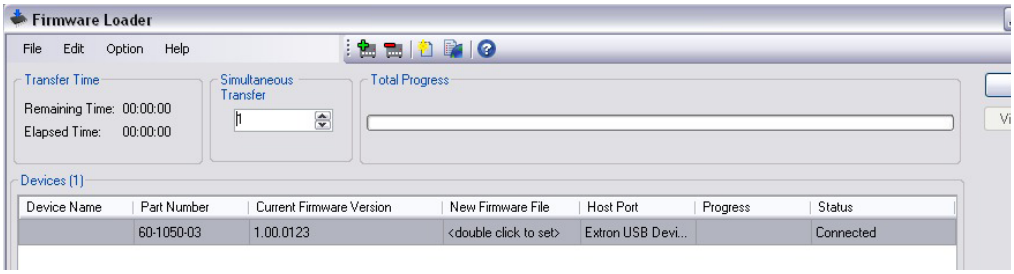
Synchronize with Device
You have elected to change from Emulate mode to Live mode. The data in this configuration must be synchronized with the data in the device. Please select an option below to continue:
Pull data from the device and update this configuration.
Push the data from this configuration to device, overwriting any data currently in it.
Advanced...
OK
Cancel

  For complete details of the Synchronize with Device option, see the *DSP Configurator Help* File.

  If the device is already connected, the **Connect to Device** option on the **Tools** menu is replaced by the **Disconnect from Device** option.

- **Issue RESET Command** — Selecting this option allows the user to reset all the device settings, except the COM settings, to the factory default values. This option is available only when in Live mode.
- **Save Changes to Device** — Selecting this option allows any configuration changes made to be saved directly to the device. This option is only available in Live mode.
- **Firmware Loader** — Selecting this option opens the Extron Firmware Loader application. If the device is in Live mode the Firmware Loader opens with the device and connection details completed.

NOTE: This widow only appears if the Firmware Loader application is already installed. **See "Firmware Upgrades" section** for details on the installation method.



The user searches for the correct S19 firmware file and proceeds with the upload as described in the *Firmware Loader Help File*.

If the device is in Emulate mode the Firmware Loader opens without the device and connection details completed. A second dialog box opens (Add Device...), and the user can select the model and connection type from the two drop-down lists.

The firmware file can also be selected using the browser field. When all fields are complete, click the **Add** button to add them to the Firmware Loader window. The user then completes the upload as described in the *Firmware Loader Help* File.

NOTE: If the MLS 608 D device is not listed, the list can be updated by clicking on **`Option > Get Updated Device List`** option in the Firmware Loader window.

When the firmware is updated, manually close the firmware loader. DSP Configurator re-opens in Emulate mode. Reconnect to the MLS 608 D unit for Live mode.

- **Organizing Building Blocks** — Selecting this option allows the organization of listed building blocks.

  A building block is a collection of processor and gain settings for a particular portion of the signal chain. This allows configuration of an entire mic input, line input, or line output channel with little effort. Building blocks files can be imported and exported for use on other computers and devices.

  A comprehensive set of pre-configured building blocks is placed on your computer system when you install DSP Configurator. The pre-configured building blocks can be used as a starting point, giving a basic device setup while staging an installation, and fine-tuning the system during commissioning in the field. Modified building blocks can be saved to create a customized set of tools unique to each installation.

  For further information on the Building Blocks, see the *DSP Configurator Help* file.

- **Configure Groups** — Select this option to open the Configure Groups dialog from which you can manage up to 32 Group Master control types, controlling up to 16 group members. Group Master control types include the **`Gain, Mute, Bass,`** and **`Treble`** settings. There are also 5 pre-configured Group masters. These are:

  - **Program Volume** — Groups gain controls at the post-switcher gain point. Default membership includes channels 1, 3, and 4 (MA and SA models). The default gain value is -10 dB.
  - **Mic Volume** — A gain control at the pre-mixer gain points in the mic/line signal chain. Default membership is channels 1 and 2. The default gain value is 0 dB.
  - **Output Bass** — A bass tone (shelving filter) boost/cut control in the line output signal path. Default membership includes all output channels. The default gain value is 0 dB.
  - **Output Treble** — A treble tone (shelving filter) boost/cut control in the line output signal path. Default membership includes all output channels. The default gain value is 0 dB.
  - **Output Volume** — A mute control that globally mutes all output volume gain points. The default mute status is unmuted.

  The MLS 608 D front panel volume knob controls the Program Volume group, and the front panel Mic Volume knob controls the Mic Volume group. While these groups cannot be deleted, group membership can be modified.

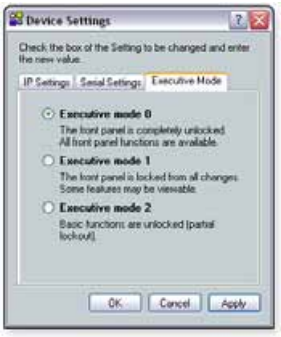
  Group masters are configured in DSP Configurator and saved in the device. Working in Emulate mode, group masters can be saved in a configuration file and pushed to the device upon connection.

  A group master can be either a gain control or a mute control. Group masters can be configured for bass and treble gain controls, provided that bass and treble filters have been inserted in a signal chain. A single control type (for group members) that is to be controlled by a group master can be selected. For example, a group master can be configured to control post-mixer trim levels, but not post-mixer trim levels plus another type of gain block. A group member can be controlled by multiple group masters though this feature should be used with caution, as overlapping membership can quickly become unmanageable.

  Group master gain controls can send specific values such as those sent by a fader control. You can also set group master gain using increment and decrement controls (using the **`Tools`** menu).

  For further information on the Group Masters, see the *DSP Configurator Help* file.

- **Device Settings** — Select this option to change the RS-232 port baud rate and set the current Executive mode (front panel lockout). This is available only in Live mode.

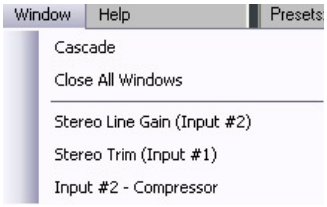

Device Settings
Check the box of the Setting to be changed and enter the new value.
IP Settings
Serial Settings
Executive Mode
Executive mode 0
The front panel is completely unlocked. All front panel functions are available.
Executive mode 1
The front panel is locked from all changes. Some features may be viewable.
Executive mode 2
Basic functions are unlocked (partial lockout).
OK
Cancel
Apply

Options — Select this option to open a dialog box to set default and user preferences. Selections are made from a drop-down list activated by a topic selection.

For complete details of changing options, see the *DSP Configurator Help* file.

Window menu

Click on this to open a drop-down list showing **`Cascade, Close All Windows`**, and where available, a list of currently open windows.



NOTE: As default, all these options are not available if there are no windows open.

Selecting **`Cascade`** arranges the windows in a cascade (origin upper left). Clicking on an open window name in the list brings that window to the front. Click on **`Close All Windows`** to close all of the open windows.

Help menu

Click on this to open a drop-down list showing **`Contents`**, **`Search`**, and **`About`**.

Clicking on **`Contents`** (or pressing <F1>) opens the DSP Configurator Help file.

The **`Search`** option allows the user to search the Help File.

The **`About`** option opens a dialog showing the DSP Configurator version and part numbers, a copyright statement, and the current firmware version of the connected unit.

MTP Video Settings

RGB Delay

During switching, the MTP video output can be set to switch the input sync source first, followed by the RGB portion of the signal. This brief delay allows the display to adjust to the new sync signal before sending the picture, providing a glitch-free switch. RGB delay can be set from 0 to 5 seconds in 0.5-second increments.

NOTE: The RGB delay only takes effect if the video input format is set to RGB.

For information on the method of setting RGB Delay, see the *DSP Configurator Help File.*

Video Mute

The MTP and HDMI video output can be muted or unmuted.

For information on the method of muting or unmuting the video output, see the *DSP Configurator Help* file.

Video Format

Video inputs 1 through 3 can be individually configured as composite video, S-video, YUV, or RGB.

For method of formatting the video inputs 1-3, see the *DSP Configurator Help* file.

MTP Settings

For MTP input 4, the input skew, level, and peaking can be set. For the MTP output on the MLS 608 D Series device, you can set the output skew and pre-peaking.

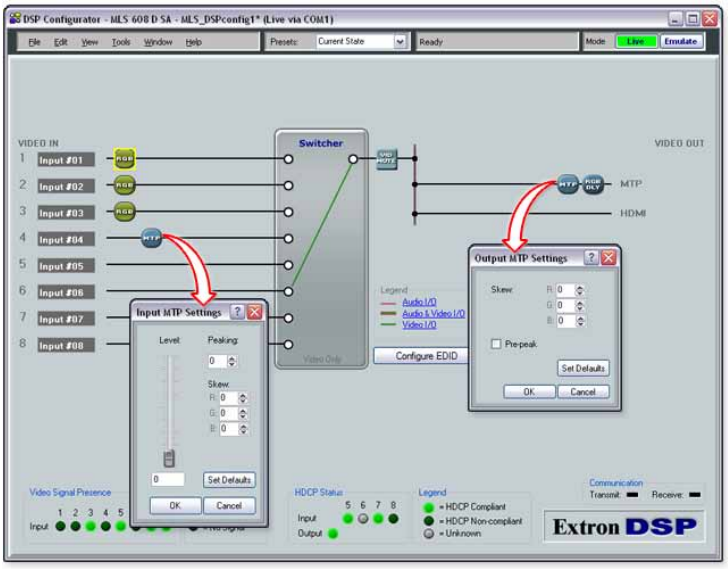


Figure 40. MTP Settings Screens

Input MTP settings

Each R, G, and B channel can skew up to 62 nanoseconds total (2 nanoseconds per step, 31 steps total).

To set the input skew:

1. Connect an oscilloscope (preferred) or a monitor (acceptable) to the VGA output of the MTP/HDMI U R receiver.
2. Apply a crosshatch pattern to the input to be optimized.
3. Use the test equipment or examine the displayed video image with a critical eye to determine which video signal (red, green, or blue) is most shifted to the left.
4. From the **View** menu in DSP Configurator, select **Video I/O** to open the Video I/O workspace. Alternatively, press <F4>, or click **Video I/O** in the Legend section of another workspace.
5. Double-click the MTP block for input 4. The Input MTP Settings dialog box opens.
6. In the Skew section, click the **Up** and **Down** arrows or enter a value into the **R, G,** or **B** fields to adjust the skew setting of the leftmost video signal towards the right until all three colors are properly converged.
7. Click **OK.**

To set the input level and peaking:

1. Apply an RGB source signal to input 4 and select that input.
2. Connect an oscilloscope (preferred) or a monitor (acceptable) to the VGA output of the MTP/HDMI U R receiver.
3. Apply the necessary test pattern to the input to be optimized via an MTP transmitter.
   - If you are using an oscilloscope, apply a white field test pattern.
   - If you are using a monitor, apply a grayscale or color bars test pattern.
4. From the **View** menu in DSP Configurator, select **Video I/O** to open the Video I/O workspace. Alternatively, press <F4>, or click **Video I/O** in the Legend section of another workspace.
5. Double-click the MTP block for input 4. The Input MTP Settings dialog box opens.
6. Observe the oscilloscope or monitor with a critical eye while you adjust the input level and peaking settings to compensate for the signal loss between the transmitter and the MTP/HDMI U R receiver.
7. To adjust the input level, click and drag the **Level** slider handle or enter a value in the field below the level.
8. To adjust the peaking, click the **Up** and **Down** arrows or enter a value in the **Peaking** field.
9. Click **OK**.

Output MTP settings

To set the output skew:

1. Connect an oscilloscope (preferred) or a monitor (acceptable) to the VGA output of the MTP/HDMI U R receiver.
2. Apply a crosshatch pattern to the input to be optimized.
3. Use the test equipment or examine the displayed video image with a critical eye to determine which video signal (red, green, or blue) is most shifted to the left.
4. From the **View** menu in DSP Configurator, select **Video I/O** to open the Video I/O workspace. Alternatively, press <F4>, or click **Video I/O** in the Legend section of another workspace.
5. Double-click the MTP block on the output side. The Output MTP Settings dialog box opens.
6. In the **Skew** section, click the **Up** and **Down** arrows or enter a value into the R, G, or B field to adjust the skew setting of the leftmost video signal to the right until all three colors are properly converged.
7. Click **OK**.

To set the output pre-peaking:

1. From the **View** menu in DSP Configurator, select **Video I/O** to open the Video I/O workspace. Alternatively, you press <F4>, or click **Video I/O** in the Legend section of another workspace.
2. Double-click the MTP block on the output side. The Output MTP Settings dialog box opens.
3. Select the **Pre-peak** check box to enable pre-peaking. To disable pre-peaking, clear the check box.

HDCP Compliance

Operation

The Audio & Video I/O workspace and the Video I/O workspace show an HDCP status indicator section. HDCP status is derived from the digital input signal or digital output signal.

The MLS 608 checks for output HDCP compliance only when the selected input source is encrypted. When the source is encrypted, the firmware authenticates the output, checking whether the sync is HDCP compliant or non-compliant.

When the selected input does not have a source connected or if the signal is not encrypted, the output HDCP status is given as "unknown". Furthermore, when no source is connected on the selected input, the TMDS lines on the Tx (output) are turned off, so HDCP encryption status is lost for the output and all the inputs. Then the HDCP status is given as unknown or unavailable.

When the MLS is currently on an active and encrypted digital input, the HDCP status indicators in the software indicate the status on all digital inputs and output. If the input is then switched to any analog input, the switcher mutes its digital output in favor of the analog input. However, because only digital video is muted, the TMDS lines are not turned off, and so the HDCP status indicators remain on.

The HDCP Status section of the workspace is enabled while in Live mode and displays the following details:

- If an HDCP-compliant source is detected on the inputs, the indicator for the associated inputs are shaded light green.
- If the active source is HDCP-compliant and the connected display is non-HDCP compliant, the output indicator is shaded dark green. If the connected display, is not HDCP compliant, the MLS 608 D Series device mutes the output.
- If the HDCP status is unknown, the associated indicator is not shaded.

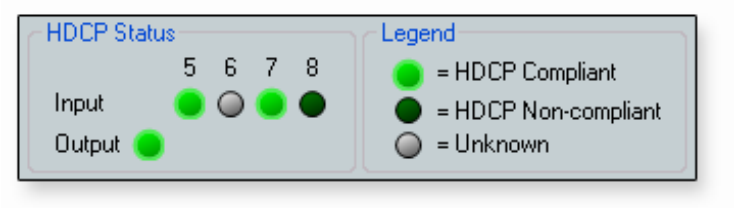


Figure 41. HDCP Status Display

Video Signal Presence

The Audio & Video I/O workspace and the Video I/O workspace show a Video Signal Presence indicator section. This section of the workspace is enabled while in Live mode and displays the following details:

- If a video signal is present on one of the eight inputs, the associated indicator is shaded light green.
- If no video signal is present, the associated indicator is shaded dark green.

Figure 42. Video Signal Status Display

SIS Programming and Control

The MLS 608 D units can be remotely controlled via a host computer or other device (such as an optional MLC 226 control system) attached to the rear panel RS-232 connector or the front panel USB configuration port.
The device can be configured and controlled by the Extron Simple Instruction Set (SIS™) of commands or by using the Extron DSP Configurator software program.

This section describes SIS communication and control. Topics that are covered include:

- **Host to MLS 608 D Communications**
- **Command and Responses**

The switcher uses a default protocol of
• 38400 baud • 1 stop bit • no parity • no flow control.

Host to MLS 608 D Communications

SIS commands consist of one or more characters per field. No special characters are required to begin or end a command sequence. When the MLS 608 D switcher determines that a command is valid, it executes the command and sends a response to the host device. All responses from the switcher to the host end with a carriage return and a line feed (CR/LF = ↵), signalling the end of the response character string (one or more characters).

MLS 608 D Switcher-initiated Messages

When a local event occurs, such as a front panel operation, the MLS 608 D responds by sending a message to the host. The MLS 608 D-initiated messages are listed below.

Boot-up messages

```
(c) Copyright 2Ø11, Extron Electronics, MLS 6Ø8 D xx, Vx.xx,
6Ø-1Ø5Ø-Øx ↵
```

The copyright message is initiated by the switcher when it is first powered on. Vx.xx is the firmware version number.

Status change messages

The switcher-initiated status change messages are a result of front panel operations (actual or software-simulated). The status change messages are the same as switcher responses to certain commands. See the last column of the command/response tables on the following pages.

Error Responses

When the switcher receives a valid command, it executes the command and sends a response to the host device. If the unit is unable to execute the command because the command contains invalid parameters, it returns an error response to the host.

Error Numbers

- E01 — Invalid input number
- E10 — Invalid command
- E11 — Invalid preset number
- E12 — Invalid port number
- E13 — Invalid parameter
- E14 — Not valid for this configuration
- E17 — Invalid command for signal type
- E22 — Busy

Error Response References

[14] = Commands that give an E14 (invalid command for this configuration) error if sent to a product whose current configuration does not support the command

Command and Responses

Using the Command/Response Tables

The following pages detail commands that can be sent to the MLS 608 D via the Extron Data Viewer (available free at **www.extron.com**) and connected via the front panel mini USB config port or via the rear panel RS-232 port using HyperTerminal.

The command/response table for SIS commands later in this section lists the commands that the MLS 608 D switcher recognizes as valid, the responses that are returned to the host, a description of each command function or the results of executing the command, and an example of each command in ASCII and URL encoding.

NOTE: Upper and lower case text can be used interchangeably except where noted.

ASCII to HEX Conversion Table																				Esc	1B	CR	ØD	LF	ØA
Space	2Ø	!	21	"	22	#	23	$	24	%	25	&	26	'	27										
(	28	)	29	*	2A	+	2B	,	2C	-	2D	.	2E	/	2F										
Ø	3Ø	1	31	2	32	3	33	4	34	5	35	6	36	7	37										
8	38	9	39	:	3A	;	3B	<	3C	=	3D	>	3E	?	3F										
@	4Ø	A	41	B	42	C	43	D	44	E	45	F	46	G	47										
H	48	I	49	J	4A	K	4B	L	4C	M	4D	N	4E	O	4F										
P	5Ø	Q	51	R	52	S	53	T	54	U	55	V	56	W	57										
X	58	Y	59	Z	5A	[	5B	\	5C	]	5D	^	5E	_	5F										
`	6Ø	a	61	b	62	c	63	d	64	e	65	f	66	g	67										
h	68	i	69	j	6A	k	6B	l	6C	m	6D	n	6E	o	6F										
p	7Ø	q	71	r	72	s	73	t	74	u	75	v	76	w	77										
x	78	y	79	z	7A	{	7B	|	7C	}	7D	~	7E	DEL	7F										

Figure 21. ASCII to Hexadecimal Character Conversion Table

Symbol Definitions

↵ = Carriage return with line feed

¦ or ← = Carriage return with no line feed

• = Space

Esc or W = Escape key

NOTE: If unit does not support or recognize the entered commands, nothing will happen and no response is issued..

[14, 24, 22,] = Superscripts indicate the error message displayed if the command is entered incorrectly or with invalid parameters. **See the "Error Response References" section**.

X1 = Input number (0-8). 0 = no connection

X2 = Analog input (1-3)

X3 = Input video format: 1 = composite, 2 = S-video, 3 = YUV, 4 = RGB (all sync formats)

X4 = RGB delay for inputs for 1 through 3, maximum delay is 5 seconds, in 0.5 second steps: 0 = 0 seconds, 1 = 0.5 seconds,... 10 = 5 seconds

X5 = Audio mute: 0 = no mute, 1 = mute

X6 = Group number: 1-32 (Group 1 is reserved for the program volume encoder. 2 is for mic volume encoder. 3 is for bass control. 4 is for treble control. 5 is for output volume mute.)

X7 = Increment and decrement dB values, in 0.1 dB steps (multiply dB by 10, so 10 = 1.0 dB)

X8 = Master volume value, 0 to -100 dB, in 0.1 dB steps. For example 0 = 0 dB, -1 = -0.1 dB, -10 = -1.0 dB, -100 = -10 dB, -1000 = -100 dB. See table below.

Master volume values, X8 = (SIS value)											
dB value	SIS value	% Output volume	dB value	SIS value	% Output volume	dB value	SIS value	% Output volume	dB value	SIS value	% Output volume
0	0	100	-21.0	-210	79.0	-51.0	-510	49.0	-81.0	-810	19.0
-0.1	-1	99.9	-22.0	-220	78.0	-52.0	-520	48.0	-82.0	-820	18.0
-0.2	-2	99.8	-23.0	-230	77.0	-53.0	-530	47.0	-83.0	-830	17.0
-0.3	-3	99.7	-24.0	-240	76.0	-54.0	-540	46.0	-84.0	-840	16.0
-0.4	-4	99.6	-25.0	-250	75.0	-55.0	-550	45.0	-85.0	-850	15.0
-0.5	-5	99.5	-26.0	-260	74.0	-56.0	-560	44.0	-86.0	-860	14.0
-0.6	-6	99.4	-27.0	-270	73.0	-57.0	-570	43.0	-87.0	-870	13.0
-0.7	-7	99.3	-28.0	-280	72.0	-58.0	-580	42.0	-88.0	-880	12.0
-0.8	-8	99.2	-29.0	-290	71.0	-59.0	-590	41.0	-89.0	-890	11.0
-0.9	-9	99.1	-30.0	-300	70.0	-60.0	-600	40.0	-90.0	-800	10.0
-1.0	-10	99.0	-31.0	-310	69.0	-61.0	-610	39.0	-91.0	-910	9.0
-2.0	-20	98.0	-32.0	-320	68.0	-62.0	-620	38.0	-92.0	-920	8.0
-3.0	-30	97.0	-33.0	-330	67.0	-63.0	-630	37.0	-93.0	-930	7.0
-4.0	-40	96.0	-34.0	-340	66.0	-64.0	-640	36.0	-94.0	-940	6.0
-5.0	-50	95.0	-35.0	-350	65.0	-65.0	-650	35.0	-95.0	-950	5.0
-6.0	-60	94.0	-36.0	-360	64.0	-66.0	-660	34.0	-96.0	-960	4.0
-7.0	-70	93.0	-37.0	-370	63.0	-67.0	-670	33.0	-97.0	-970	3.0
-8.0	-80	92.0	-38.0	-380	62.0	-68.0	-680	32.0	-98.0	-980	2.0
-9.0	-90	91.0	-39.0	-390	61.0	-69.0	-690	31.0	-99.0	-990	1.0
-10.0	-100	90.0	-40.0	-400	60.0	-70.0	-700	30.0	-100.0	-1000	0
-11.0	-110	89.0	-41.0	-410	59.0	-71.0	-710	29.0			
-12.0	-120	88.0	-42.0	-420	58.0	-72.0	-720	28.0			
-13.0	-130	87.0	-43.0	-430	57.0	-73.0	-730	27.0			
-14.0	-140	86.0	-44.0	-440	56.0	-74.0	-740	26.0			
-15.0	-150	85.0	-45.0	-450	55.0	-75.0	-750	25.0			
-16.0	-160	84.0	-46.0	-460	54.0	-76.0	-760	24.0			
-17.0	-170	83.0	-47.0	-470	53.0	-77.0	-770	23.0			
-18.0	-180	82.0	-48.0	-480	52.0	-78.0	-780	22.0			
-19.0	-190	81.0	-49.0	-490	51.0	-79.0	-790	21.0			
-20.0	-200	80.0	-50.0	-500	50.0	-80.0	-800	20.0			

X9 = Group member OID numbers

X10 = Inputs 5-8: 5 = 30008, 6 = 30010, 7 = 30012, 8 = 30014

X11 = Audio format: 0 = analog, 1 = digital (default)

X12 = Preset number: 1-8.

X13 = Mic number (mute inputs): 40000 = Mic 1, 40001 = Mic 2

X14 = Audio inputs 1-10: 1-8 = program audio inputs, 9 = Mic 1 input, 10 = Mic 2 input.

X15 = Audio output number: 1-4

X16 = Input signal peaking adjustment range: 0-255

X17 = Skew adjustment value: 0-31, in 2 ns increments (for example 31 = 62 ns)

X18 = Video plane: 0 = red, 1 = green, 2 = blue

X19 = Input signal level adjustment range: 0-255 (default = 60).

X20 = Output bass/treble master value (240 to -240, default = 0), multiplied dB by 10.
(for example 230 = +23 dB, -210 = -21 dB.)

X21 = DDC value (EDID). See table on next page

X22 = Video group: 1 = VGA, 2 = HDMI

X23 = Output selection: 1 = analog buffered VGA output on MLS 608 D, 2 = digital HDMI output on MTP/HDMI U R.

X24 = Analog EDID user definable locations: 49 = user 1, 50 = user 2.

X25 = Digital EDID user definable locations: 51 = user 3, 52 = user 4.

X26 = EDID: 0 = current assigned EDID, 1 = user loaded 49 when X22 = 1, user loaded 51 when X22 = 2, 2 = user loaded 50 when X22 = 1, user loaded 52 when X22 = 2

X27 = 128 or 256 byte EDID raw HEX (text form)

X28 = Native resolution and refresh rate response, for example 1280x720@60

X29 = Inputs 5 through 8 only (for HDCP commands)

X31 = Input HDCP status:
0 = source connected but not HDCP compliant.
1 = source connected and is HDCP compliant.
2 = no source connected.
3 = HDCP status not known

X32 = Output HDCP status:
0 = output connected, current input source encrypted, output is not HDCP compliant
1 = output connected, current input source encrypted, output is HDCP compliant
2 = no output connected
3 = output connected, current input source is not encrypted or not connected, output HDCP status not known

X33 = HDCP notification = green screen notification on the output when a source is non-HDCP compliant: 0 = black, 1 = green (default)

X34 = Power save mode: 0 = off (default), 1 = on

X35 = Firmware version number (x.xx)

X37 = Device part number:
60-1050-01 = MLS 608 D
60-1050-02 = MLS 608 D MA
60-1050-03 = MLS 608 D SA

X38 = MLS 608 D, or MLS 608 D MA, or MLS 608 D SA

X39 = Video signal status: 0 = video /TMDS not detected, 1 = video /TMDS detected, - = unknown

X40 = Voltage in volts (V)

X41 = Temperature in degrees C, response is three digits with leading zero (31°C = 031).

X42 = Audio mute to DSP: 0 = audio unmuted, 1 = audio muted

EDID Resolution/Refresh Rate Combination with SIS Variables (where X21 = 1 through 64)*					
Digital Signal			Analog Signal		
Resolution	Refresh Rate (Hz)	SIS value for X21	Resolution	Refresh Rate (Hz)	SIS value for X21
Automatic Mode (digital only)		0	800x600	60	29
800x600	60	1	1024x768 **(default)**	60	30
1024x768	60	2	1280x768	60	31
1280x768	60	3	1280x800	60	32
1280x800	60	4	1280x1024	60	33
1280x1024	60	5	1360x768	60	34
1360x768	60	6	1366x768	60	35
1366x768	60	7	1440x900	60	36
1440x900	60	8	1400x1050	60	37
1400x1050	60	9	1600x1200	60	38
1600x1200	60	10	1680x1050	60	39
1680x1050	60	11	1920x1200	60	40
1920x1200	60	12	576p	50	41
576p, 2-ch PCM Audio	50	13	480p	60	42
480p, 2-ch PCM Audio	60	14	720p	50	43
576p, Multi-ch Audio	50	15	720p	60	44
480p, Multi-ch Audio	60	16	1080i	50	45
720p, 2-ch PCM Audio	50	17	1080i	60	46
720p, 2-ch PCM Audio **(default)**	60	18	1080p	50	47
720p, Multi-ch Audio	50	19	1080p	60	48
720p, Multi-ch Audio	60	20	User Loaded #1		49
1080i, 2-ch PCM Audio	50	21	User Loaded #2		50
1080i, 2-ch PCM Audio	60	22			
1080i, Multi-ch Audio	50	23			
1080i, Multi-ch Audio	60	24			
1080p, 2-ch PCM Audio	50	25			
1080p, 2-ch PCM Audio	60	26			
1080p, Multi-ch Audio	50	27			
1080p, Multi-ch Audio	60	28			
User Loaded #3		51			
User Loaded #4		52			
800x600, 2-ch PCM Audio	60	53			
1024x768, 2-ch PCM Audio	60	54			
1280x768, 2-ch PCM Audio	60	55			
1280x800, 2-ch PCM Audio	60	56			
1280x1024, 2-ch PCM Audio	60	57			
1360x768, 2-ch PCM Audio	60	58			
1366x768, 2-ch PCM Audio	60	59			
1440x900, 2-ch PCM Audio	60	60			
1400x1050, 2-ch PCM Audio	60	61			
1600x1200, 2-ch PCM Audio	60	62			
1680x1050, 2-ch PCM Audio	60	63			
1920x1200, 2-ch PCM Audio	60	64			

* See the "**SIS Programming and Control**" section for full details and use of SIS variables.

NOTE: EDIDs values 53 though 64 are available only with firmware 1.03 or higher.

Figure 22. EDID Table with SIS Commands

X43 = Executive mode (front panel lock): 0 = off (all unlocked, default), 1 = lockout all (input buttons and encoders), 2 = lockout input buttons only

X44 = Baud rate: 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600, 28800, 38400 (default), 57600, 115200

X45 = Parity, **O**dd, **E**ven, **N**one (default), **M**ark, **S**pace, (only use first letter, for example **N** = **N**one)

X46 = Data bits: 7, 8 (default = 8)

X47 = Stop bits: 1, 2 (default = 1)

X48 = Verbose mode: 0 = no verbose mode and non-tagged responses for queries, 1 = verbose mode and non-tagged responses for queries (default), 2 = no verbose and tagged responses for queries, 3 = verbose mode and tagged responses for queries

X49 = Mute status: 0 = mute off, 1 = mute on (default)

X50 = Mute value: +00000 = off, +00001 = on (default)

X51 = Mic number: 40100 = Mic 1, 40101 = Mic 2

X52 = Alpha numeric up to 24 characters. No special characters except hyphen (-). No lower/upper case distinction, no blanks or spaces. First character must be alpha, last cannot be hyphen

X53 = Alpha numeric name. Combination of unit name and last three pairs of unique alpha-numeric characters (for example MLS-608-D-MA-06-DE-2E.

X54 = Mic value: 0 to -100 dB, in 0.1 dB steps. For example 2048 = 0 dB, 2047 = -0.1 dB, 2038 = -1 dB, 1948 = -10 dB, 1048 = -100 dB. See table below.

Mic Pre-mixer Gain Values, X54 = (SIS value)											
dB value	SIS value	% volume	dB value	SIS value	% volume	dB value	SIS value	% volume	dB value	SIS value	% volume
0	2048	100	-21.0	1838	79.0	-51.0	1538	49.0	-81.0	1238	19.0
-0.1	2047	99.9	-22.0	1828	78.0	-52.0	1528	48.0	-82.0	1228	18.0
-0.2	2046	99.8	-23.0	1818	77.0	-53.0	1518	47.0	-83.0	1218	17.0
-0.3	2045	99.7	-24.0	1808	76.0	-54.0	1508	46.0	-84.0	1208	16.0
-0.4	2044	99.6	-25.0	1798	75.0	-55.0	1498	45.0	-85.0	1198	15.0
-0.5	2043	99.5	-26.0	1788	74.0	-56.0	1488	44.0	-86.0	1188	14.0
-0.6	2042	99.4	-27.0	1778	73.0	-57.0	1478	43.0	-87.0	1178	13.0
-0.7	2041	99.3	-28.0	1768	72.0	-58.0	1468	42.0	-88.0	1168	12.0
-0.8	2040	99.2	-29.0	1758	71.0	-59.0	1458	41.0	-89.0	1158	11.0
-0.9	2039	99.1	-30.0	1748	70.0	-60.0	1448	40.0	-90.0	1148	10.0
-1.0	2038	99.0	-31.0	1738	69.0	-61.0	1438	39.0	-91.0	1138	9.0
-2.0	2028	98.0	-32.0	1728	68.0	-62.0	1428	38.0	-92.0	1128	8.0
-3.0	2018	97.0	-33.0	1718	67.0	-63.0	1418	37.0	-93.0	1118	7.0
-4.0	2008	96.0	-34.0	1708	66.0	-64.0	1408	36.0	-94.0	1108	6.0
-5.0	1998	95.0	-35.0	1698	65.0	-65.0	1398	35.0	-95.0	1098	5.0
-6.0	1988	94.0	-36.0	1688	64.0	-66.0	1388	34.0	-96.0	1088	4.0
-7.0	1978	93.0	-37.0	1678	63.0	-67.0	1378	33.0	-97.0	1078	3.0
-8.0	1968	92.0	-38.0	1668	62.0	-68.0	1368	32.0	-98.0	1068	2.0
-9.0	1958	91.0	-39.0	1658	61.0	-69.0	1358	31.0	-99.0	1058	1.0
-10.0	1948	90.0	-40.0	1648	60.0	-70.0	1348	30.0	-100.0	1048	0
-11.0	1938	89.0	-41.0	1638	59.0	-71.0	1338	29.0			
-12.0	1928	88.0	-42.0	1628	58.0	-72.0	1328	28.0			
-13.0	1918	87.0	-43.0	1618	57.0	-73.0	1318	27.0			
-14.0	1908	86.0	-44.0	1608	56.0	-74.0	1308	26.0			
-15.0	1898	85.0	-45.0	1598	55.0	-75.0	1298	25.0			
-16.0	1888	84.0	-46.0	1588	54.0	-76.0	1288	24.0			
-17.0	1878	83.0	-47.0	1578	53.0	-77.0	1278	23.0			
-18.0	1868	82.0	-48.0	1568	52.0	-78.0	1268	22.0			
-19.0	1858	81.0	-49.0	1558	51.0	-79.0	1258	21.0			
-20.0	1848	80.0	-50.0	1548	50.0	-80.0	1248	20.0			

Command Response Table for SIS Commands

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional Description
Input Selection			
Select video and audio input	X1!	Chn X1 ↵	Select a video and audio input source X1
View current input	!	X1 ↵	View currently selected input source X1.
Select a video input	X1&	Vid X1 ↵	Select a video only input source X1.
View current video input	&	X1 ↵	View currently selected video input source X1.
Select an audio input	X1$	Aud X1 ↵	Select an audio only input source X1.
View current audio input	$	X1 ↵	View currently selected audio input source X1.
Video Configuration			
Set analog video format	X2*X3\	Inp X2 •Typ=X3 ↵	Set input X2 to X3.
View video format	X2 \	X3 ↵	View video format X3 for analog input X2.
Video Mute (Output)			
NOTE: Mutes all video: composite, S-video, component, RGB and digital (TMDS).			
Video mute	1B	Vmt 1 ↵	Mute video outputs.
Video unmute	ØB	Vmt Ø ↵	Unmute video outputs.
View mute status	B	Ø or 1 ↵	View mute status.
HDMI Audio Mute (Output)			
NOTE: Mutes the embedded audio on the HDMI output.			
Audio mute	1Z	Amt 1 ↵	Mute audio output.
Audio unmute	ØZ	Amt Ø ↵	Unmute audio output.
View mute status	Z	Ø or 1 ↵	View output mute status.
Mic Input Mute control			
NOTE: This command controls the first gain block of the mic input. See the *DSP Configurator Help* file for details.			
Set mic input mute	Esc M X13 * X49 AU ←	DsM X13 * X49 ↵	Set the mic input mute X49 for mic X13.
View mute value	Esc M X13 AU ←	X49 ↵	View mic mute value X49.
Mic Pre-mixer Gain Control			
NOTE: This command controls the gain blocks immediately after the ducker blocks. See the *DSP Configurator Help* file for details.			
Set mic value	Esc G X51 * X54 AU ←	DsG X51 * X54 ↵	Set the Mic value X54 for Mic X51.
View mic value	Esc G X51 AU ←	X54 ↵	View value X54.

NOTE:
X1 = Input selection: 0 through 8, 0 = no connection
X2 = Analog input: 1 through 3
X3 = Input video format: 1= composite, 2 = S-video, 3= YUV, 4 = RGB (all sync formats), default = RGB
X13 = Mic number (mute inputs): 40000 = Mic 1, 40001 = Mic 2
X49 = Mute status: 0 = mute off, 1 = mute on (default)
X51 = Mic number, 40100 = Mic 1, 40101 = Mic 2
X54 = Mic value: 0 to -100 dB, in 0.1 dB steps. For example 2048 = 0 dB, 2047 = -0.1 dB, 2038 = -1 dB, 1048 = -10 dB, 1048 = -100 dB, **See mic gain table on page 68 for details**.

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional Description
Set Group Master Value			
Set value (dB)	Esc D X6 * X8 GRPM ←	GrpmD X6 * X8 ↵	Set the value X8 for group number X6.
NOTE: Reserved groups are: 1 = program volume, 2 = mic volume, 3 = output bass, 4 = output treble, 5 = output volume mute.			
Audio mute or unmute	Esc D X6 * X5 GRPM ←	GrpmD X6 * X5 ↵	Mute or unmute X5 for group number X6.
Increment value	Esc D X6 * X7 + GRPM ←	GrpmD X6 * X7 ↵	Increase the value by X7 for group number X6.
Decrement value	Esc D X6 * X7 - GRPM ←	GrpmD X6 * X7 ↵	Decrease the value by X7 for group number X6.
View master value	Esc D X6 GRPM ←	X8 ↵	View group master value X8.
Program Volume (Group Master 1)			
Set value (dB)	Esc D1 * X8 GRPM ←	GrpmDØ1 * X8 ↵	Set the value X8 for group master 1.
	Example: Esc D1 * Ø GRPM ←	GrpmDØ1 *+ØØØØØ ↵	Sets the value to 0 dB.
	Example: Esc D1 * - 1ØØ GRPM ←	GrpmDØ1 * - ØØ1ØØ ↵	Sets the value to -10 dB.
	Example: Esc D1 * - 1ØØØ GRPM ←	GrpmDØ1 * - Ø1ØØØ ↵	Sets the value to -100 dB.
Increment value	Esc D1 * X7 + GRPM ←	GrpmDØ1 * X8 ↵	Increase the value X8 by X7.
Decrement value	Esc D1 * X7 - GRPM ←	GrpmDØ1 * X8 ↵	Decrease the value X8 by X7.
View master value	Esc D1 GRPM ←	X8 ↵	View current program volume master value X8.
Mic Volume (Group Master 2)			
Set value (dB)	Esc D2 * X8 GRPM ←	GrpmDØ2 * X8 ↵	Set the value X8 for group master 2.
	Example: Esc D2 * Ø GRPM ←	GrpmDØ2 *+ØØØØØ ↵	Sets the value to 0 dB.
	Example: Esc D2 * - 1ØØ GRPM ←	GrpmDØ2 * - ØØ1ØØ ↵	Sets the value to -10 dB.
	Example: Esc D2 * - 1ØØØ GRPM ←	GrpmDØ2 * - Ø1ØØØ ↵	Sets the value to -100 dB.
Increment value	Esc D2 * X7 + GRPM ←	GrpmDØ2 * X8 ↵	Increase the value X8 by X7.
Decrement value	Esc D2 * X7 - GRPM ←	GrpmDØ2 * X8 ↵	Decrease the value X8 by X7 .
View master value	Esc D2 GRPM ←	X8 ↵	View master mic volume value X8.

NOTE:
X5 = Audio mute: 0 = no mute, 1 = mute
X6 = Group master number: 1 through 32, groups 1 through 5 are reserved groups, see note above.
X7 = Increment and decrement dB values: in 0.1 dB steps (multiply dB by 10, for example 10 = 1.0 dB).
X8 = Master volume value: 0 to -100 dB, in 0.1 dB steps, For example 0 = 0 dB, -1 = -0.1 dB, -10 = -1.0 dB, -100 = -10 dB, -1000 = -100 dB. **See master volume table on page 64 for details**.
X9 = Group member OID number

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional Description
Output Bass Adjustment (Group Master 3)			
Set gain (dB)	Esc D3*X20GRPM↵	GrpmDØ3*X20↵	Set the gain value X20 for group master 3.
	Example: Esc D3*24ØGRPM↵	GrpmDØ3*+ØØ24Ø↵	Sets the gain value to +24 dB.
	Example: Esc D3*ØGRPM↵	GrpmDØ3*+ØØØØØ↵	Sets the gain value to 0 dB.
	Example: Esc D3*-1ØØGRPM↵	GrpmDØ3*-ØØ1ØØ↵	Sets the gain value to -10 dB.
Increment gain	Esc D3*X7+GRPM↵	GrpmDØ3*X20↵	Increase the gain value X20 by X7.
Decrement gain	Esc D3*X7-GRPM↵	GrpmDØ3*X20↵	Decrease the gain value X20 by X7.
View master value	Esc D3GRPM↵	X20↵	View master bass output value X20.
Output Treble Adjustment (Group Master 4)			
Set gain (dB)	Esc D4*X20GRPM↵	GrpmDØ4*X20↵	Set the gain value X20 for group master 4.
	Example: Esc D4*24ØGRPM↵	GrpmDØ4*+ØØ24Ø↵	Sets the gain value to +24 dB.
	Example: Esc D4*ØGRPM↵	GrpmDØ4*+ØØØØØ↵	Sets the gain value to 0 dB.
	Example: Esc D4*-1ØØGRPM↵	GrpmDØ4*-ØØ1ØØ↵	Sets the gain value to -10 dB.
Increment gain	Esc D4*X7+GRPM↵	GrpmDØ4*X20↵	Increase the gain value X20 by X7.
Decrement gain	Esc D4*X7-GRPM↵	GrpmDØ4*X20↵	Decrease the gain value X20 by X7.
View master value	Esc D4GRPM↵	X20↵	View master treble output value X20.
Overall Output Volume Mute Setting (Group Master 5)			
NOTE: This command mutes the program and mic audio. It does not mute the embedded audio on the HDMI output signal.			
Set volume mute	Esc D5*X49GRPM↵	GrpmDØ5*X49↵	Set the volume mute X49 for group master 5.
View master value	Esc D5GRPM↵	X50↵	View master volume mute value X50.
Audio Input Format			
NOTE: For audio inputs 5-8. Selects between analog (5-pole captive screw) or digital (embedded in HDMI input).			
Set format	Esc DX10*X11AU↵	DsDX10*X11↵	Sets audio input X10 to format X11.
View format	Esc DX10AU↵	X11↵	View audio format X11 for input X10.

NOTE:
X7 = Increment and decrement dB values: in 0.1 dB steps (multiply by 10, for example 10 = 1.0 dB).
X10 = Inputs 5-8: 5 = 30008, 6 = 30010, 7 = 30012, 8 = 30014
X11 = Audio format: 0 = analog, 1 = digital (default setting)
X20 = Output bass/treble master value: 240 to -240, default 0, decibel value multiplied by 10. For example 230 = +23 dB, -210 = -21 dB.
X49 = Mute status: 0 = mute off, 1 = mute on (default)
X50 = Mute value: +00000 = off, +00001 = on (default)

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional Description
RGB Delay Time			
NOTE: RGB delay affects only inputs 1-3 and if they are configured to RGB format.			
Set RGB delay	Esc X4 D←	Dly X4 ↵	Set RGB delay to (X4 x 0.5) seconds.
View setting	Esc D←	X4 ↵	View RGB delay setting.
MTP Output Pre-peaking			
Set output pre-peak on	Esc 1Opek←	Opek1↵	Turn output pre-peak on.
Set output pre-peak off	Esc ØOpek←	OpekØ↵	Turn output pre-peak off (default).
View status	Esc Opek←	1↵ or Ø↵	View pre-peaking status.
MTP Input Signal Level Adjustment			
Specify a value	Esc X19 ILVL←	Ilvl X19 ↵	Specify an input signal level value X19.
Increment value	Esc +ILVL←	Ilvl X19 ↵	Increase the signal level value by 1.
Decrement value	Esc -ILVL←	Ilvl X19 ↵	Decrease the signal level value by 1.
View current value	Esc ILVL←	X19 ↵	View current level X19.
MTP Input Signal Peaking Adjustment			
Specify a value	Esc X16 IPEK←	Ipek X16 ↵	Specify an input peaking value X16.
Increment value	Esc +IPEK←	Ipek X16 ↵	Increase value by 1.
Decrement value	Esc -IPEK←	Ipek X16 ↵	Decrease value by 1.
View current value	Esc IPEK←	X16 ↵	View current X16.

NOTE: X4 = RGB delay for inputs 1-3: maximum delay is 5 seconds, in 0.5 second intervals, default = 0 seconds
X16 = Input signal peaking adjustment range: 0 to 255 (default = 0)
X19 = Input signal level adjustment range: 0 to 255 (default = 60)

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional Description
Input Skew Adjustment			
Set input skew values	Esc X17 * X17 * X17 ISEQ ←	Iseq X17 * X17 * X17 ↵	Set input skew values X17 for R, G, and B signals (IseqR*G*B).
Increment one input skew value	Esc X18 + ISEQ ←	Iseq X17 * X17 * X17 ↵	Increase the skew value of X18 by 1.
Decrement one input skew value	Esc X18 - ISEQ ←	Iseq X17 * X17 * X17 ↵	Decrease the skew value of X18 by 1.
View current values	Esc ISEQ ←	X17 * X17 * X17 ↵	View skew values.
Output Skew Adjustment			
Set output skew values	Esc X17 * X17 * X17 OSEQ ←	Oseq X17 * X17 * X17 ↵	Set output skew values X17 for R, G, and B signals (OseqR*G*B).
Increment one output skew value	Esc X18 + OSEQ ←	Oseq X17 * X17 * X17 ↵	Increase the skew value of X18 by 1.
Decrement one output skew value	Esc X18 - OSEQ ←	Oseq X17 * X17 * X17 ↵	Decrease the skew value of X18 by 1.
View current values	Esc OSEQ ←	X17 * X17 * X17 ↵	View skew values.
Recall Presets			
Recall preset	X12 .	Rpr X12 ↵	Recall preset X12 .
View Preset Ties			
View preset video tie	Esc X12 * 1 * 1VC ←	X1 • Vid ↵	View the video input X1 tied as a preset.
View preset audio tie	Esc X12 * 1 * 2VC ←	X1 • Aud ↵	View the audio input X1 tied as a preset.
Naming Presets			
Write preset name	Esc X12 , *name* NG ←	Nmg X12 , *name* ↵	Name preset X12.
Read preset name	Esc X12 NG ←	*name* ↵	View name X12.
Naming Inputs and Outputs			
Write input name	Esc X14 , *name* NI ←	Nmi X14 , *name* ↵	Name input X14.
Read input name	Esc X14 NI ←	*name* ↵	View input X14 name.
Write output name	Esc X15 , *name* NO ←	Nmo X15 , *name* ↵	Name output X15.
Read output name	Esc X15 NO ←	*name* ↵	View output X15 name.

NOTE:
- If preset is unassigned, name displays [unassigned].
- If preset is saved but not yet named, default is "Preset X12"(where X12 is the preset number).
- If user tries to name when preset is unassigned, unit responds with E11.
- If user tries to recall an unsaved preset, unit responds with E11.
- Invalid characters: ~ , @ = ' [ ] { } < > " ; : | \ and ?.

NOTE:
X1 = Input selection: 0-8, 0 = no connection
X12 = Preset number: 1-8
X14 = Inputs 1-8: 1-8 = program audio inputs, 9 = Mic 1 audio input, 10 = Mic 2 audio input
X15 = Output number: 1-4
X17 = Skew adjustment value: 0-31, in 2 ns increments (for example 31 = 62 ns)
X18 = Video plane: 0 = red, 1 = green, 2 = blue

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional Description
EDID Management			
Assign EDID data to inputs (analog and digital inputs)	Esc A X22 * X21 EDID ←	EdidA X22 * X21 ↵	Assign EDID data X21 to inputs VGA or HDMI X22
View EDID data assigned	Esc A X22 EDID ←	X21 ↵	View EDID data assignment.
Save an output EDID to (analog) user loaded space	Esc S X23 * X24 EDID ←	EdidS X23 * X24 ↵	Save display EDID to analog user space.
Save an output EDID to (digital)user loaded space	Esc S X23 * X25 EDID ←	EdidS X23 * X25 ↵	Save display EDID to digital user space.
View/read EDID in hex format	Esc R X22 EDID ←	X27 ↵	View EDID data in hex format for X22.
View EDID native resolution	Esc N X22 * X26 EDID ←	X28 ↵	View native resolution and refresh rate.
HDCP Management			
View input HDCP status	Esc I X29 HDCP ←	X31 ↵	Signal present, HDCP, non HDCP, or HDCP status unknown.
View output HDCP	Esc O HDCP ←	X32 ↵	Output connected, HDCP, non HDCP, or HDCP status unknown.
View HDCP status for all HDMI inputs	Esc I * HDCP ←	X31[5] * X31[6] * X31[7] * X31[8] ↵	HDCP, non HDCP, or HDCP status unknown (for all HDMI inputs).
Set HDCP notification	Esc N X33 HDCP ←	HdcpN X33 ↵	Show green or black screen.
View HDCP notification setting	Esc N HDCP ←	X33 ↵	

NOTE:
X21 = DDC value (EDID). **See EDID table on page 66 for details**.
X22 = Video group: 1 = VGA, 2 = HDMI
X23 = Output selection: 1 = analog buffered VGA connector on MLS 608 D, 2 = digital HDMI connector on MTP/HDMI U R
X24 = Analog EDID user definable locations: 49 = user 1, 50 = user 2
X25 = Digital EDID user definable locations: 51 = user 3, 52 = user 4
X26 = EDID, 0 = current assigned EDID: 1 = user loaded 49 when X22 = 1, user loaded 51 when X22 = 2; 2 = user loaded 50 when X22 = 1, user loaded 52 when X22 = 2
X27 = 128 or 256 byte EDID raw hex (text form)
X28 = Native resolution and refresh rate, for example 1280x720@60
X29 = Inputs 5 through 8 only (for HDCP commands)
X31 = Input HDCP status: 0 = source is connected but not HDCP compliant, 1 = source is connected and is HDCP compliant, 2 = no source connected, 3 = HDCP status not known
X32 = Output HDCP status: 0 = output is connected, current input source encrypted, output is not HDCP compliant, 1 = output is connected, current input source encrypted, output is HDCP compliant, 2 = no output connected, 3 = output is connected, current input source is not encrypted or not connected, output HDCP status not known
X33 = HDCP notification = green screen notification on the output when a display is non-HDCP compliant: 0 = black, 1 = green (default)

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional Description
Power Save Mode			
Turn power save off	Esc ØPSAV ←	Psav X34 ↵	
Turn power save on	Esc 1PSAV ←	Psav X34 ↵	
View power save	Esc PSAV ←	X34 ↵	View power save status.
Front panel security lockout (Executive Mode)			
Enable Executive mode 1	1X	Exe1 ↵	Lock out front panel buttons and knobs.
Enable Executive mode 2	2X	Exe2 ↵	Lock out front panel buttons only.
Disable Executive mode	ØX	ExeØ ↵	Unlock all front panel controls.
View Executive mode status	X	Ø ↵ (or) 1 ↵ (or) 2 ↵	View the current status: 0 = off [default]; 1 = on, lock all buttons and knobs; 2 = on, lock input buttons only.
Information Requests			
View firmware version	Q or 1Q	x.xx ↵	View the firmware version.
View part number	N	X37 ↵	View the part number X37.
View AV input	I	Vid X1 •Aud X1 ↵	View current AV input.
View model name	1I	X38 ↵	View model name X38.
View video signal presence	LS	X39 *X39 *X39 *X39 *X39 *X39 * X39 *X39 ↵	Shows signal presence for all inputs, 1-8.
View +1.5V FPGA voltage	15S	+ X40 ↵	
View internal temp in °C	2ØS	+ X41 ↵	
View audio mute to DSP	4ØS	X42 ↵	

NOTE:
X1 = Input selection: 0-8, 0 = no connection
X34 = Power save mode: 0 = off (default), 1 = on
X37 = Device part number: 60-1050-01 = MLS 608 D, 60-1050-02 = MLS 608 D MA, 60-1050-03 = MLS 608 D SA
X38 = MLS 608 D, or MLS 608 D MA, or MLS 608 D SA
X39 = Video signal status: 0 = video /TMDS not detected, 1 = video /TMDS detected, - = unknown
X40 = Voltage in volts (V)
X41 = Temperature in degrees C, response is three digits with leading zeros (for example 031 = 31°C)
X42 = Audio mute to DSP: 0 = audio unmuted, 1 = audio muted

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional Description
Reset (Zap)/Erase Commands			
Reset all video and audio settings to factory default	Esc ZXXX ←	Zpx ↵	Resets all video and audio settings.
Reset all settings to factory default	Esc ZQQQ ←	Zpq ↵	Resets all video and audio settings, protected, configuration, verbose mode, and control port settings.
NOTE: This command is the same as reset mode 5. **See the Mode 5 details** in the "Operations" section.			
Delete all presets and names	Esc ZG ←	Zpg ↵	Removes all presets and preset names.
Delete individual preset	Esc X12 ZG ←	Zpg X12 ↵	Removes a selected preset.
Bidirectional Serial Port Commands			
Configure parameters[24]	Esc 1* X44 , X45 , X46 , X47 CP ←	CpnØ1 X44 , X45 , X46 , X47 ↵	Set baud rate X44, parity X45, data bits X46, and stop bits X47.
View parameters	Esc 1CP ←	X44 , X45 , X46 , X47 ↵	View baud rate X44, parity X45, data bits X46, and stop bits X47.
Verbose settings			
Set verbose mode	Esc X48 CV ←	Vrb X48 ↵	Set verbose mode parameters.
View parameters	Esc CV ←	X48 ↵	View verbose mode parameters.
Unit name			
Set unit name	Esc X52 CN ←	Ipn• X52 ↵	Set unit name.
Set unit name to default	Esc •CN ←	Ipn• X53 ↵	Set unit name to default
View unit name	Esc CN ←	X52 ↵	View unit name

NOTE:
X12 = Preset number: 1-8
X44 = Baud rate: 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600, 28800, 38400 (default), 57600, 115200
X45 = **P**arity, **O**dd, **E**ven, **N**one (default), **M**ark, **S**pace (only use first letter, for example **N** = **N**one)
X46 = Data bits: 7, 8 (default = 8)
X47 = Stop bits: 1, 2 (default = 1)
X48 = Verbose mode: 0 = no verbose mode and non-tagged responses for queries, 1 = verbose mode and non-tagged responses for queries (default), 2 = no verbose and tagged responses for queries, 3 = verbose mode and tagged responses for queries
X52 = Alpha numeric up to 24 characters. No special characters except hyphen (-). No lower or upper case distinction, no blanks or spaces. First character must be alpha, last cannot be hyphen.
X53 = Alpha numeric name. Combination of unit name and last three pairs of unique alpha-numeric characters, (for example MLS-608-D-MA-06-DE-2E).

User Interface Navigation

This section describes the use of the PC mouse and keyboard, including the associated hot keys used when configuring the MLS 608 D device with DSP Configurator.
Topics that are covered include:

- **Mouse and Keyboard Navigation**
- **Keyboard Shortcuts**

Mouse and Keyboard Navigation

Mouse navigation in the DSP Configurator application is mostly consistent with standard Microsoft® Windows® behavior.

Some keyboard navigation behavior matches Microsoft Windows standards, while other behavior is specific to DSP Configurator. SpeedNav™ keyboard navigation in DSP Configurator has been designed to allow navigation within the application and the execution of all configuration functions to be performed solely with the use of a keyboard.

Initial keyboard use — When you first launch the program, the cursor focus is in the upper left corner, on the input 1 Gain block. From there, use the keyboard arrow keys and <Tab> key to move within the program. <Shift + Tab> reverses the direction of the <Tab> key. Use the arrow keys to move to the channel name fields, then press <Tab> (input) or <Shift + Tab> (output) to move out of the name fields.

Selecting Multiple Blocks

A selected area (block) can be cut, copied, then pasted (see the "**Pasting to a Single Location**" and "**Pasting to Multiple Locations**" subsections below). The selection can also be saved to a preset.

To select multiple blocks of elements:

1. Starting at any corner of the area to be highlighted, click the left mouse button and drag the cursor over the desired blocks.
2. Release the mouse button. The highlighted blocks are outlined in green.

Selecting Multiple Areas

You can select additional areas and retain the previous selection.

To select multiple areas:

Press <Ctrl> (on keyboard) while clicking the additional elements.

Alternatively,

Press <Ctrl> while clicking and dragging the cursor over an additional group of elements.

These methods of selection are used when selecting elements prior to saving a preset.

Copying a Block of Elements

1. Select the elements to be copied
2. Use one of the following methods to copy the elements:
   - Right-click the selection and select **Copy** from the drop-down menu.
   - From the **Edit** menu, select **Copy**.
   - Press <Ctrl + C> on the keyboard.

Cutting a Block of Elements

When an element is cut, the element is not removed until it has been pasted.

1. Select the elements to be cut (see the "**Selecting Multiple Blocks**" and "**Selecting Multiple Areas**" subsections above).
2. Use one of the following methods to cut the elements:
   - Right-click the selection and select **Cut** from the drop-down menu.
   - From the **Edit** menu, select **Cut**.
   - Press <Ctrl + X> on the keyboard.

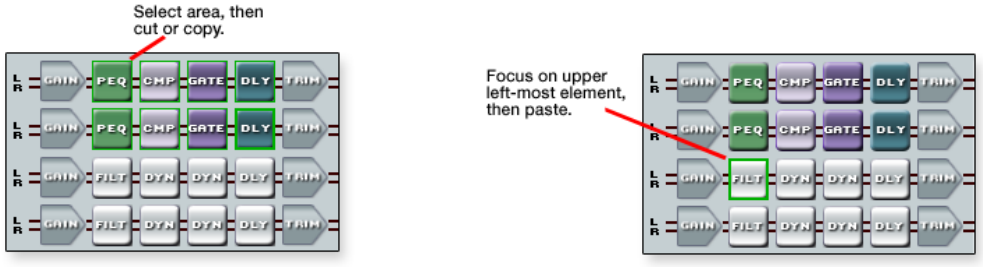
Pasting to a Single Location

A selected block of elements can be cut or copied, then pasted to a single location.

To paste a block of elements to a single location:

1. Click the upper left-most element that matches the upper left-most element of the area that you cut or copied.
2. Use one of the following methods to paste the elements:
   - Right-click on the upper left element and select **Paste** from the drop-down menu.
   - From the **Edit** menu, select **Paste**.
   - Press <Ctrl + V> on the keyboard.

In the figure below left, all of the processor blocks in the top two rows have been selected (the upper left-most block is a filter block) and then cut or copied. In the figure below right, the upper left-most block has been selected (also a filter block) in the area to which the elements will be pasted. The first two rows will be pasted to the second two rows.



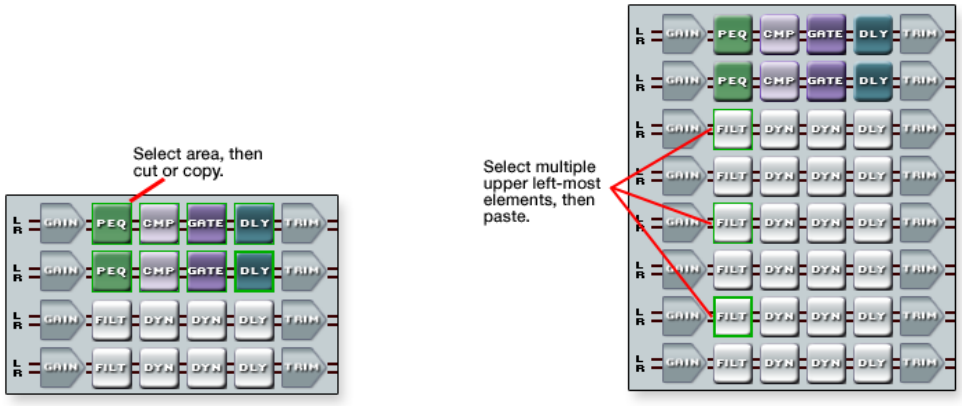
Pasting to Multiple Locations

A selected block of elements can be cut or copied, then pasted to multiple locations.

To paste a block of elements to multiple locations:

1. Click the upper left-most element that matches the upper left-most element of the area that you cut or copied.
2. Press and hold the <Ctrl> key while repeating step **1** for every area to which you want to paste. Make sure that the area to which you are pasting will not overlap.
3. Release the <Ctrl> key.
4. Use one of the following methods to paste the block of elements.
   - From the **`Edit`** menu, select **`Paste`**.
   - Press <Ctrl + V> on the keyboard.

In the figure below left, all of the processor blocks in the top two rows have been selected (the upper left-most block is a Filter block) and then cut or copied. In the figure below right, the upper left-most blocks have been selected (also Filter blocks) for each set of two rows to which to paste. The first two rows will be pasted three times.



Keyboard Shortcuts

The following is a list of keyboard shortcuts (or strokes) used in navigating and using the DSP Configurator. Not included in this list is the use of the menus via keyboard strokes, for example using <Alt + E + P>, the **`Edit`** > **`Paste`** menu instead of <Ctrl +V>. Details of those strokes, if needed, can be found in the *DSP Configurator Help* file.

Action	Key Press
Open *DSP Configurator Help* file, or, when within a dialog box, open context-specific help.	<F1>
Open the Audio and Video workspace.	<F2>
Open the Audio I/O workspace.	<F3>
Open the Video I/O workspace.	<F4>
Open the Console View workspace.	<F5>
Toggle between Live and Emulate modes.	<F6>
Execute an action (for example opening a dialog box, or a button action).	<Enter>
Cut selected element.	<Ctrl + X>
Copy selected element.	<Ctrl + C>
Paste selected element.	<Ctrl + V>
Select all switcher nodes.	<Ctrl + A>
Select all elements within the program.	<Ctrl + A + A>
Open navigate to and open menus. **NOTE:** When <Alt> is pressed the first menu is highlighted. To navigate to other menus press the <Right arrow> or <Left arrow> key as needed. The <Tab> key action is same as the <Right arrow> key.	<Alt + first letter of menu> (for example <Alt +F> opens **`File`** Menu). Use <Tab> or arrow keys to move as needed.
Navigate within menu drop-down box to a submenu. **NOTE:** Press <Esc> repeatedly to back out of the menu selection.	<Down arrow> or <Up arrow> as appropriate.
Making switcher ties (sequence of keystrokes)	
1. Navigate to input 1 node. **NOTE:** Input 1 shows a yellow fill.	Press <Tab> repeatedly.
2. Enter "make tie" mode	Press and hold <Shift>.
3. Navigate to output node **NOTE:** Input 1 and output nodes show a green border.	<Right arrow>
4. Navigate back to select a desired input **NOTE:** All inputs show a green border. Current input location has yellow fill. A dotted brown line connects the current input to output. To exit this mode before making the tie, press <Esc>.	<Left arrow> and <Down arrow> or <Up arrow>.
5. Make the tie for desired input **NOTE:** All inputs show a green border. The current input location has a yellow fill. The dotted brown line becomes a solid line.	Release <Shift> and Press <Enter>.

Action	Key Press
Select, cut or copy, and paste multiple elements (sequence of keystrokes)	
1. Navigate to the block where elements are to be selected. **NOTE:** Press <Tab> to go directly to the start of an element block.	<Right arrow> and <Down arrow> repeatedly, as needed.
2. Select multiple elements. **NOTE:** Selected elements show a green border.	Press and hold <Shift>. Use the <Right arrow> and <Down arrow> or <Up arrow> to select elements. Release <Shift> when all desired cells are selected.
3. Cut or copy selected elements.	<Ctrl + X> or <Ctrl + C>
4. Navigate to row or area where elements are to be pasted. **NOTE:** Navigate to the cell at the start of the row or upper left corner of the area. The area or cells to be pasted into must be exactly the same size as, or exact multiples of, the block of cells originally cut or copied. For example, a copy of two 3-cell rows can be directly pasted into two, four, or six, 3-cell rows, but not into one, three, or five, 3-cell rows. Multiple rows or areas to paste into can be selected by holding down the <Shift> key when using the <Down arrow>	<Down arrow> or <Up arrow> and <Left arrow>.
5. Paste multiple elements into selected row or area. **NOTE:** A confirmation dialog box opens. Click **Yes** to continue and overwrite the cells, or **No** to stop the pasting and exit without overwriting the existing information.	<Ctrl + V>
Saving a preset (sequence of keystrokes)	
1. Navigate to the block where elements are to be selected. **NOTE:** Press <Tab> to go direct to the start of an element block.	<Right arrow> and <Down arrow> repeatedly, as needed.
2. Select multiple elements. **NOTE:** Selected elements show a green border.	Press and hold <Shift>. Use <Right arrow> and <Down arrow> or <Up arrow> to select elements. Release <Shift> when all desired cells are selected. Press <Right arrow> once to move away from selection.
3. To save the selected elements to a preset.	<Alt + T>, <Right arrow>, <Down arrow>, <Down arrow>.
4. Confirm save **NOTE:** Two dialog boxes open. The first box advises what items are saved and it can be set not to open during future preset saves. The second box inputs the name or number for the saved preset.	Press <Enter> and complete the information fields (preset number and name) in the second dialog box.

Button Labels

This section describes the procedure for replacing button labels.

In this section, a strip of blank button labels is provided. If desired, photocopy them or cut them out of the manual, write button information in each button area, and put them in the applicable input or output buttons. You can also create labels using the free Extron Button-Label Generator software, which is available at **www.extron.com**.

Installing Labels in the MLS 608 D Switcher Buttons

Install new labels in the front panel buttons as follows:

1. Make new labels using either the blanks below or the Button-Label Generator software. Cut them out.

NOTE: For best results, print on transparent or translucent material.

2. Remove the button from the switcher: use a small, flat bladed screwdriver such as an Extron Tweeker to gently pry a button out from the front panel (see figure below).

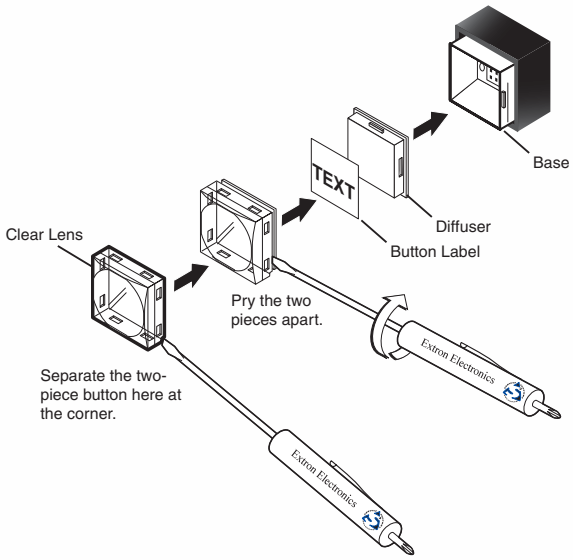
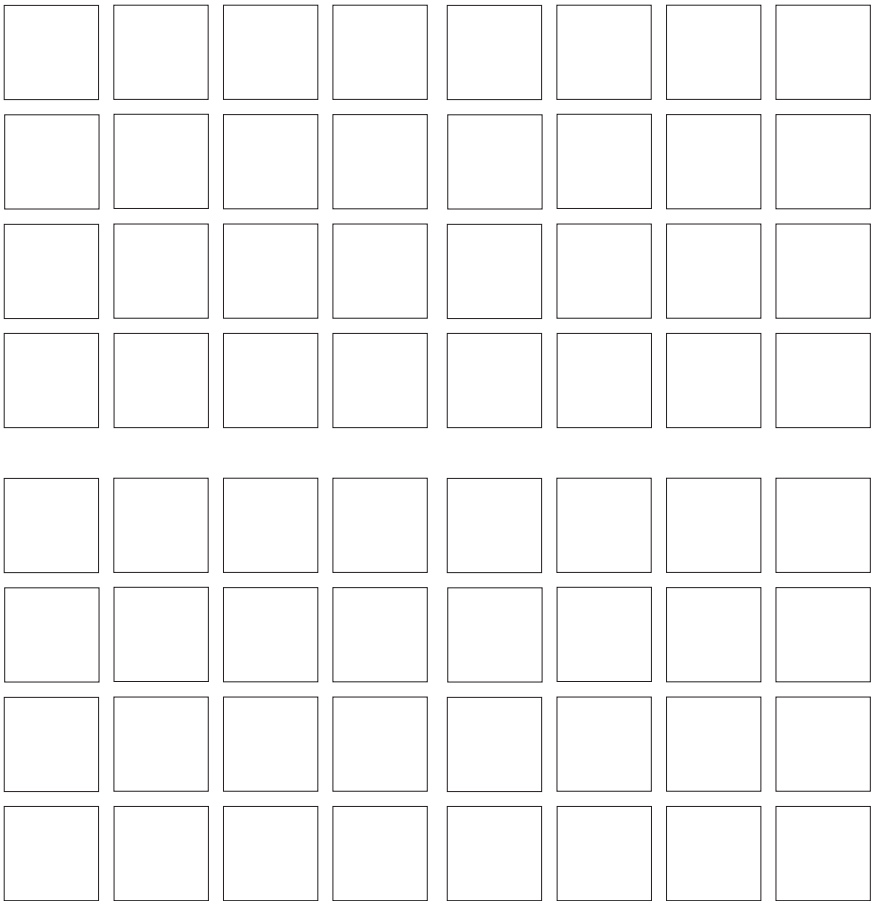


Figure 43. Illuminated Button Label Replacement

3. Locate the notch in the corner of one side of the clear button cap lens.
4. Separate the white backing (diffuser) from the clear button cap (lens); insert the blade of the small screwdriver into the corner notch and gently twist the blade.

5. Save the translucent, white diffuser, but remove the text/label insert from the transparent button cap lens.
6. Insert the replacement button label into the button cap. Check for correct label orientation.
7. Align the white diffuser plate with the cap (lens). The bumps on the diffuser plate should be aligned (top and bottom) with the notches on the clear button cap. Firmly snap it into place.
8. Align the tabs on the plunger with the notches on the diffuser plate. Gently, but firmly, press the reassembled button into place in the switcher front panel.
9. Repeat steps **2** to **8** as needed to relabel other buttons.

Blank Button Labels



Reference Material

This section provides information about:

- **Specifications**
- **Part Numbers and Accessories**

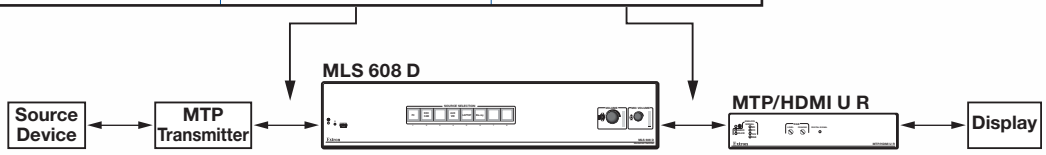
Specifications

Video — MLS analog inputs

Gain ..... Unity
Differential phase error ..... 1° at 3.58 MHz and 4.43 MHz
Differential gain error ..... 1% at 3.58 MHz and 4.43 MHz
Crosstalk ..... -68 dB @ 10 MHz, -39 dB @ 100 MHz
Switching speed ..... <100 ms (max.)
Skew compensation ..... Up to 62 ns (adjustable)
Signal transmission distance, analog

MLS 608 D with MTP/HDMI U R
Analog Signal Maximum Transmission Distances

Resolutions	High Quality Signal	
	Input (MTP transmitter to MLS)	Output (MLS to MTP/HDMI U R)
1024x768 @ 60 Hz, 75 Hz	450' (135 m)	450' (135 m)
720p @ 60 Hz	400' (120 m)	400' (120 m)
1920x1200 @ 60 Hz, 1080p @ 60 Hz	300' (90 m)	250' (75 m)



Video — MLS digital inputs

Maximum data rate ..... 6.75 Gbps (2.25 Gbps per color)
Maximum pixel clock ..... 225 MHz
Resolution range ..... Up to 1920x1200 or 1080p @ 60 Hz
Formats ..... RGB and YCbCr digital video
Standards ..... DVI 1.0, HDMI 1.3 compatible

NOTE: *Appropriate HDMI to DVI-D cables or adapters are required for DVI signal input/output.

Video input and loop-through MLS

Number/signal type
Analog ..... 3 RGBHV, RGBS, component video, S-video, or composite video input
1 RGBHV, RGBS loop-through
1 analog proprietary signal from an Extron MTP transmitter

NOTE: The switcher does not accept or pass RS-232 serial signals from an MTP transmitter on the MTP input.

Digital video ..... 4 HDMI (or DVI*) digital video
Connectors ..... 4 female 15-pin HD: 3 for input, 1 for buffered loop-through
1 female RJ-45 for MTP input
4 female HDMI

Nominal level ..... 1 Vp-p for Y of component video and S-video, and for composite video
0.7 Vp-p for RGB and for R-Y and B-Y of component video
0.3 Vp-p for C of S-video

Minimum/maximum levels
- Inputs 1-3
  - RGB ..... Analog: 0.3 V to 1.5 Vp-p with no offset
  - S-video, composite video.... Analog: 0.4 V to 2.0 Vp-p with no offset
- Input 4
  - RGB ..... Analog: 0.3 V to 1.5 Vp-p with no offset
  - S-video, composite video.... Analog: 0.8 V to 1.5 Vp-p with no offset

Impedance
- Analog inputs ..... 75 ohms

Horizontal frequency ..... 15 kHz to 145 kHz
Vertical frequency..... 30 Hz to 170 Hz
Resolution range ..... Up to 1920x1200 or 1080p @ 60 Hz
Return loss
- RGB..... <-40 dB @ 5 MHz
- S-video, composite video ..... <-30 dB @ 5 MHz

DC offset (max. allowable)
- Inputs 1-3..... 1.5 V
- Input 4 ..... 1.0 V

Video output — MLS

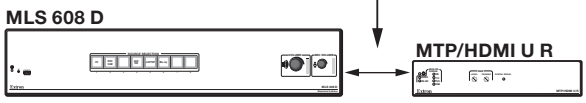
Number/signal type ..... 3 proprietary signals for an Extron MTP/HDMI U R receiver: 1 analog, 2 digital
Connectors ..... 3 female RJ-45 for CAT 5/5e/6 UTP (unshielded twisted pair) or STP (shielded twisted pair) cables connecting the MLS 608 D to an MTP/HDMI U R receiver

NOTE: Shielded twisted pair cable is recommended for the video output connections.

Maximum resolution ..... 1920x1200 or 1080p @ 60 Hz (for digital output)
Signal transmission distance, digital

MTP/HDMI U R
Digital Signal Maximum Transmission Distances

8-bit Color Depth			
Resolutions	**CAT 5/5e/6 Cable**		**Extron STP201 Cable**
	UTP	**STP**	
1024x768, 720p, 1080i @ 60 Hz	200' (60 m)	200' (60 m)	200' (60 m)
1600x1200, 1920x1200, 1080p @ 60 Hz	100' (30 m)	125' (38 m)	150' (46 m)



NOTE: Shielded twisted pair cable provides added protection from outside interference and increases overall signal transmission distance. Extron strongly recommends using shielded twisted pair for optimal performance.

Sync — MLS

Input type ..... RGBHV, RGBS, component video
Standards..... TTL (RGB), NTSC 3.58, NTSC 4.43, PAL, SECAM
Input level ..... 2.0 V to 5.0 Vp-p
Output level ..... 5.0 Vp-p
Input impedance ..... 585 ohms
Polarity..... Negative

Audio — MLS

Gain
- Input 4 ..... Unbalanced output: 0 dB; balanced output: 6 dB
- All other inputs ..... Unbalanced output: -6 dB; balanced output: 0 dB

Frequency response
- Power amp (MA model) ..... 80 Hz to 20 kHz, -3 dB to +1 dB @ 1 watt output (11 Vrms)
- Power amp (SA model) ..... 20 Hz to 20 kHz, -3 dB to +1 dB @ 1 watt output, 8 ohm load
- Input 4
  - Lineout ..... 20 Hz to 20 kHz, ±0.5 dB
  - Output 3 ..... 20 Hz to 20 kHz, ±1 dB
- All other inputs
  - Lineout ..... 20 Hz to 20 kHz, ±0.2 dB

THD + Noise
- Power amp (amplifier models only) <0.1% @ 1 kHz, at -3 dB
- Input 4
  - Output 3 ..... <0.15% @ 1 kHz at nominal level
- All other inputs
  - Lineout ..... <0.01% @ 1 kHz at nominal level

S/N at max. power output or line level output (unweighted)
- Power amp (amplifier models only) >90 dB at 20 Hz to 20 kHz, 8 ohm load
- Input 4
  - Lineout ..... >90 dB, balanced
  - Output 3 ..... >90 dB, balanced
- All other inputs
  - Lineout ..... >100 dB, balanced

Crosstalk
- Power amp (amplifier models only) <-70 dB @ 1 kHz
- Lineout ..... <-90 dB @ 1 kHz, fully loaded

Stereo channel separation
- Input 4 ..... Not applicable (mono)
- All other inputs ..... >96 dB @ 1 kHz

CMRR
- Input 4 ..... Not applicable (mono)
- All other inputs ..... >70 dB @ 1 kHz

Volume range
- Program volume ..... -100 dB to 0 dB (in 0.1 dB steps)
- Mic volume ..... -100 dB to +12 dB (in 0.1 dB steps)

Audio input — MLS

Number/signal type ..... 7 stereo, line level, balanced/unbalanced (inputs 1-3, 5-8 analog)
2 mono, line level, balanced/unbalanced (mic/line level inputs)
1 proprietary analog signal (mono, from MTP input 4)
4 stereo, de-embedded from HDMI (2-channel, PCM only, from HDMI inputs 5-8)

Connectors ..... (7) 3.5 mm captive screw connectors, 5 pole (inputs 1-3, 5-8)
(2) 3.5 mm captive screw connectors, 3 pole (mic/line level inputs)
1 female RJ-45 connector (shared with video signals from MTP)

Impedance ..... >10k ohms unbalanced, 20k ohms balanced, DC coupled

Nominal level
- Mic/line input ..... Mic level, -60 dBV (1 mVrms) when mic gain is set to +40 dB
- All other inputs ..... +4 dBu (1.23 Vrms) when level is set to 0 dB

Maximum level
- Mic/line input ..... +21 dBu when Mic gain is set to 0 dB
- Input 4 ..... +15 dBu, unbalanced when output 3 gain is set to 0 dB
- All other inputs ..... +21 dBu when input gain is set to 0 dB

Input gain adjustment
- Mic/line input ..... -18 dB to +80 dB, adjustable per input
- All other inputs..... -18 dB to +24 dB, adjustable per input

Mic phantom power..... +48 VDC (can be switched on or off)

NOTE: 0 dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV ≈ 2 dBu.

Audio output — line level (all models) — MLS

Number/signal type ..... 2 stereo or dual mono, balanced/unbalanced (fixed or variable, selectable)
1 dual mono, balanced/unbalanced (fixed or variable, selectable), via MTP

Connectors ..... (2) 3.5 mm captive screw connectors, 5 pole

Impedance ..... 50 ohms unbalanced, 100 ohms balanced

Gain error ..... ±0.2 dB channel to channel

Nominal level ..... +4 dBu (1.23 Vrms)

Maximum level (Hi-Z)..... >+21 dBu, balanced; >+15 dBu, unbalanced

NOTE: Unbalanced wired outputs have -6 dB gain. Balanced outputs result in a 0 dB gain.

Audio output — power amplifier (amplifier models only) — MLS

Number/signal type
- MA model ..... 1 mono, 70 V line
- SA model..... 1 stereo (default) or 2 mono, 2 channels total

Connector..... (1) 5 mm screw lock captive screw connector, 4 pole

NOTE: These connectors accept wires of 22 AWG to 12 AWG.

Load impedance
- MA model ..... 123 ohms minimum
- SA model..... 4 or 8 ohms

Amplifier type ..... Class D

Output power
- MA model ..... 40 watts (rms), 70 V, 1 kHz, 1% THD
- SA model..... 20 watts (rms) per channel, 4 or 8 ohms, 1 kHz, 1% THD

Protection ..... Clip limiting, thermal, short circuit, DC output

Control/remote — switcher — MLS

NOTE: The front panel USB port and rear panel RS-232 port are independent of each other and can be used at the same time.

Serial control port..... 1 bidirectional RS-232: 1 rear panel 3.5 mm captive screw connector, 5 pole (uses 3 poles)

Baud rate and protocol..... 300 to 115200 baud (38400 baud = default); 8 (default) or 7 data bits; 1 (default) or 2 stop bits; no parity (default), or even, odd, mark, or space parity; no flow control (default)

Serial control pin configuration..... 1 = Tx, 2 = Rx, 3 = GND, 4 = neutral/GND, 5 = +12 VDC

NOTE: The +12 VDC and ground pins can be used to power a MediaLink® Controller.

USB control ports ..... 1 front panel female mini USB B

USB standards ..... USB 2.0, low speed

Program control ..... Extron DSP Configurator™ software for Windows®
Extron Simple Instruction Set (SIS™)

Control/remote — external device (pass-through) — MLS

Serial control port input..... Bidirectional RS-232 via (1) 3.5 mm captive screw connector, 5 pole (uses 3 poles)

Serial control port output ..... 1 set of proprietary signals on a female RJ-45 jack

NOTE: Protocol is mirrored between the MLS 608 D and the MTP/HDMI U R receiver.

Serial control pin configuration..... Captive screw connector: 1 = Tx, 2 = Rx, 3 = GND, 4 = n/a, 5 = n/a

General — MLS

Power supply	Internal Input: 100-240 VAC, 50-60 Hz
MLS 608 D	1.0 A
MLS 608 D MA, MLS 608 D SA	1.2 A
Power consumption	
Full load (amp output at 1/8 power)	
MLS 608 D	42 watts
MLS 608 D MA	56 watts
MLS 608 D SA	54 watts
Standby	4 watts
Auxiliary power output	
Port 1	12 watts, 12 VDC, on a 2 pole connector
Port 2	7.2 watts, 12 VDC, on a 5 pole connector shared with the serial control port
Temperature/humidity	Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, noncondensing Operating: +32 to +111 °F (0 to +43.9 °C) / 10% to 90%, noncondensing
Cooling	Convection, vents on sides and top
Thermal dissipation	
MLS 608 D, full load	143 BTU/hr
MLS 608 D MA, full load, amp output at 1/8 power	191 BTU/hr
MLS 608 D SA, full load, amp output at 1/8 power	185 BTU/hr
Standby, all models	13.7 BTU/hr
Rack mount	Yes, with included brackets
Enclosure type	Metal
Enclosure dimensions	3.5" H x 17.5" W x 12.0" D (2U high, full rack wide) (8.9 cm H x 44.4 cm W x 30.5 cm D) (Depth excludes connectors, knob, and buttons. Width excludes rack ears.)
Product weight	7 lbs (3.2 kg)
Shipping weight	13 lbs (6 kg) including MTP/HDMI U R receiver
DIM weight	
USA/Canada	21 lbs (10 kg)
International	25 lbs (12 kg)
Vibration	ISTA 1A in carton (International Safe Transit Association)
Regulatory compliance	
Safety	CE, c-UL, UL
Compliances	CE, C-tick, FCC Class A, ICES, VCCI
Environmental	Complies with the appropriate requirements of RoHS, WEEE
Accessibility	Section 508 of the Rehabilitation Act (29 U.S.C. 794d)
MTBF	30,000 hours
Warranty	3 years parts and labor

Video — MTP/HDMI U R

MTP input
- Gain ..... Unity
- Maximum resolution
  - Analog..... Up to 2048x1080 or 1080p at 60 Hz
- Signal transmission distance, analog
  See the "Video — MLS analog inputs" section of these specifications

HDMI digital input
- Maximum data rate ..... 4.95 Gbps (1.65 Gbps per color)
- Maximum pixel clock ..... 165 MHz
- Maximum resolution
  - Digital..... Up to 1920x1200 or 1080p at 60 Hz
- Signal transmission distance, digital
  See the "Video output — MLS" section of these specifications

NOTE: The transmission distance varies greatly depending on the signal resolution and on the type of cable, graphics card, and display used in the system.

- Formats ..... RGB and YCbCr digital video
- Standards ..... DVI 1.0, HDMI 1.2

Video input — MTP/HDMI U R

Number/signal type
- Analog inputs..... 1 set of proprietary analog signals
- HDMI digital input ..... 1 set of proprietary digital signals

Connectors
- MTP input..... 1 female RJ-45
- HDMI digital input ..... 2 female RJ-45

Video output — MTP/HDMI U R

Number/signal type
- Analog output..... 1 RGBHV, RGBS, component video (bi-level and tri-level), S-video, composite video (follows input type)
- HDMI digital output..... 1 single link HDMI (or DVI-D*)

Connectors
- Analog output..... 1 female 15-pin HD for RGB
  3 female BNC for Y, R-Y, B-Y
  1 female 4-pin mini DIN for S-video (Y/C)
  1 female BNC for composite video
- HDMI digital output..... 1 female HDMI type A

Nominal levels..... Analog outputs:
1 Vp-p for Y of component video and S-video, and for composite video
0.7 Vp-p for RGB and for R-Y and B-Y of component video
0.3 Vp-p for C of S-video

Minimum/maximum level ..... Analog outputs: 0.8 V to 1.2 Vp-p

Impedance ..... Analog outputs: 75 ohms (during video output only)

Return loss ..... Analog outputs: <-30 dB @ 5 MHz (during video output only)

DC offset ..... Analog outputs: <±20 mV with input at 0 offset

Sync — analog outputs — MTP/HDMI U R

- Output type ..... RGBHV, RGBS, Component video (bi- or tri-level)
- Standards..... NTSC 3.58, NTSC 4.43, PAL, SECAM
- Output level ..... 4.0 V to 5.0 Vp-p, unterminated
- Output impedance ..... 87 ohms (24 mA)
- Polarity..... Positive or negative (selectable)

Audio — from MTP input — MTP/HDMI U R

Gain	Unbalanced output: 0dB; balanced output +6 dB
Frequency response	20 Hz to 20 kHz, ±1 dB
THD + Noise	0.15% @ 1 kHz, 0.3% @ 20 kHz at nominal level
S/N	>70 dB at maximum output (unweighted)

Audio input — from MTP input, MTP/HDMI U R — see MLS 608 D's audio output specifications

Number/signal type	1 set of proprietary analog signals
Connectors	1 female RJ-45

NOTE: 0 dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV ≈ 2 dBu.

Audio output — from MTP input — MTP/HDMI U R

Number/signal type	2 mono, balanced/unbalanced
Connectors	(1) 3.5 mm captive screw connector, 5 pole
Impedance	50 ohms unbalanced, 100 ohms balanced
Gain error	±1 dB channel to channel

Control/remote — external device (pass-through) — from HDMI input — MTP/HDMI U R

Serial control port input/output	RS-232 via (1) 3.5 mm, 3 pole captive screw connector

NOTE: The serial communications link of a MTP/HDMI U R is bidirectional.

Serial control pin configuration	Captive screw connectors: 1 = Tx, 2 = Rx, 3 = GND

Control/remote — external device (pass-through, unidirectional or bidirectional) from MTP input — MTP/HDMI U R

NOTE: This port is not used when the MTP/HDMI U R is used with an MLS 608 D Series switcher.

Serial control port input/output	RS-232 via (1) 3.5 mm, 5 pole captive screw connector (3 poles are used)
Baud rates	Up to 38400 bps at up to 600' (183 m) (Higher data rates and distances are possible. Performance varies based on baud rate and cable length.)
Protocol	Data bits = 5 - 8 Stop bits = 1 or 2 Parity = odd, even, none Flow control = XON, XOFF, none

NOTE: Protocol is mirrored between the transmitter and the receiver.

Serial control pin configuration	Captive screw connector: 1 = Tx, 2 = Rx, 3 = GND

General — MTP/HDMI U R

Recommended cable type	Shielded (recommended) or unshielded
MTP input	CAT 5/5e/6
HDMI digital input	CAT 5/5e/6, Extron STP201

NOTE: Shielded twisted pair cable provides added protection from outside interference and increases overall signal transmission distance. Extron strongly recommends using shielded twisted pair for optimal performance.

Power supply	External Input: 100-240 VAC, 50-60 Hz Output: 12 VDC, 1 A, 12 watts
Power consumption	9.8 watts
Temperature/humidity	Storage: -40 to +158°F (-40 to 70°C)/10% to 90%, noncondensing Operating: +32 to +122°F (0 to +50°C)/10% to 90%, noncondensing
Cooling	Convention, no vents
Thermal dissipation	18.1 BTU/hr
Mounting	
Rack mount	Yes, with optional 1U rack shelf
Furniture mount	Yes, with optional under-desk mounting kit
Pole mount	Yes, with optional projector mounting kit
Enclosure type	Metal
Enclosure dimensions	1.7" H x 8.75" W x 3.0" D (half rack wide) (4.3 cm H x 22.2 cm W x 7.6 cm D) (Depth excludes connectors.)
Product weight	0.8 lbs (0.4 kg)
Shipping weight	13 lbs (6 kg) including MLS 608 switcher
Vibration	ISTA 1A in carton (International Safe Transit Association)
Regulatory compliance	
Safety	CE, c-UL, UL UL rated for use in plenum airspaces: meets UL 2043 for heat and smoke release, excluding the power supply.
EMI/EMC	CE, C-tick, FCC Class A, ICES, VCCI
MTBF	30,000 hours
Warranty	3 years parts and labor

NOTE: All nominal levels are at ±10%.

NOTE: Specifications are subject to change without notice.

Part Numbers and Accessories

Included Parts

Only one model of the MLS 608 D series is included in the system shipped.

Description	Part Number
Models	
MLS 608 D	60-1052-01
(or) MLS 608 D MA	60-1052-02
(or) MLS 608 D SA	60-1052-03
MTP/HDMI U R	60-1048-01
Rubber feet (not attached) (8)	
MBD 249 Rack Mount and Through-Desk Kit	70-155-01
PS 1210 C +12 V, 1 A, Power Supply (1)	70-775-01
IEC power cord (1)	
Setup Guide	

Optional Parts

These items can be ordered separately:

Description	Part Number
PMK 150 Pole Mount Kit	70-739-02
MLC 226 IP Enhanced MediaLink® Controller with IP Link® Ethernet Control	60-600-02
TLP 1000TV 10 inch Tabletop TouchLink™ Touchpanel	60-1104-02
IPL 250 IP Link® Control Processor	60-1026-81
HDMI Pro Series High Speed and Standard Speed HDMI Cables	26-650-xxx
HDMI Ultra Series Ultra Flexible High Speed HDMI Cables	26-663-xx
SI 26CT Two-Way Ceiling Speakers with 8 inch Back Can and 70/100 V Transformer	42-070-03
SI 26X Two-Way, Open Back, Ceiling, 8 Ohm Speakers	42-067-03
CSR 6 Captive Screw to RCA Female Audio Adapter	26-575-01
STP201 Shielded Twisted Pair Cable, Non-plenum	22-214-03
STP201P Shielded Twisted Pair Cable, Plenum	22-215-03
HDMIM-DVIDF HDMI Male to DVI-D Female Adapter	26-617-01
DVID SL Pro Series Single Link DVI-D Cables	26-649-xxx

Extron Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

USA, Canada, South America, and Central America:
Extron Electronics
1001 East Ball Road
Anaheim, CA 92805
U.S.A.

Japan:
Extron Electronics, Japan
Kyodo Building, 16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

Europe, Africa, and the Middle East:
Extron Europe
Hanzeboulevard 10
3825 PH Amersfoort
The Netherlands

China:
Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

Asia:
Extron Asia
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363
Singapore

Middle East:
Extron Middle East
Dubai Airport Free Zone
F12, PO Box 293666
United Arab Emirates, Dubai

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions, or if modifications were made to the product that were not authorized by Extron.

NOTE: If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

USA: (714) 491-1500 **Europe**: 31.33.453.4040
Asia: 65.6383.4400 **Japan**: 81.3.3511.7655

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

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